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THE
IRISH BUILDER

AND

Engineering Record.

PUBLISHED ON THE 1st AND 15th OF EVERY MONTH.

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“The empire of man over material things, has for its only foundation the Sciences and the Arts.”—LORD BACON.

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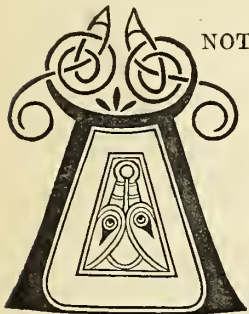
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THE IRISH BUILDER

And Engineering Record.

Our Eleventh Year.



NOTHER notch has been cut. Again the word "FINIS" is written in the rolls of time. Another and a new year has dawned upon us; and in a retrospect of the past we cannot but congratulate ourselves that the old

year, now closed in for ever, has been one of possibly more than average prosperity.

In Dublin, Belfast, Cork, Galway, Limerick and Londonderry, as well as in all the provincial towns, the artizan classes have been, with few exceptions, fully and remuneratively employed. Within a few years, the aspect of the leading thoroughfares of Dublin have been all but remodelled. Palatial buildings are now erected in many of its prominent positions; yet we have not eclipsed the glorious creations of our ancestors. The Bank of Ireland, the Courts of Law, the Custom House, City Hall, and Trinity College, stand out in bold relief before us, shewing what they could do; but shall we, so far advanced before them as we are in knowledge—and science, which is systematized knowledge—pronounce ourselves inferior to them? We fear we shall; not from want of artistic taste, but because opportunities for the erection of buildings like these do not occur except in the lapse of centuries. Withal, we may be well pleased with Dublin of eighteen hundred and sixty-nine, which no longer reminds us of Dublin as it existed in the days of our youth.

Belfast, comparatively speaking with regard to its population, has made still further advances in an architectural point of view. Its principal buildings evince an amount of educated art which any metropolitan city might well feel proud of; while its suburban extension is nearly akin (although we would prefer seeing a more substantial style of building adopted) to the newer growth of transatlantic cities; and when we remember what Belfast was just one hundred years ago, we may well pause, and wonder.

Cork, and the other provincial cities and towns have been, within the past few years, all shewing numerous evidences of architectural improvement; and the word "progress," at first timidly advanced, is now loudly responded to, and appears to have had numerous echoes in all.

An advance in the rate of the wages of the builders' labourer has, we are happy to perceive, been cheerfully responded to by the large firms, and by all the influential builders, which must tend materially to improve the condition of this class; but we would be glad to see another and much needed movement

made in their behalf—we mean the providing of suitable dwellings. It is a truism "that one half of the world do not know how the other half exist;" and if a few of this half of philanthropic turn, with capital and leisure at their disposal, would occasionally wend their way through some of our filthy lanes and bye-ways of sickening odour, and ascend some of their dilapidated stairways into tottering, overcrowded attics, utterly devoid of the commonest appliances for the wants or even the decencies of social life—the domicile of the labourer, where his family endure in constant privation a miserable existence—perhaps they might be (possibly in self-defence) more than convinced of the justice of our remarks. To be sure, something has been done by the Industrial Tenements Company; but, as well as we can judge, their operations have not been upon a scale sufficiently expansive to meet the wants of this class. It is to be remembered that the builders' labourer cannot afford, even with a scantily increased hire, to pay more at the outside than one shilling and sixpence weekly for lodging, while upon an average he must support a family of from three to four. Sometimes, it may be, he is unemployed, and must run in arrear; withal, he contrives to meet his landlord's demand. Would it not, therefore, be a humanizing work to promote an improved class of labourers' dwellings? We think it would. Speculation!—it would not pay! (we hate the words)—is reiterated upon all sides; yet after all it might be (though not in the strict sense of the term) a paying speculation for the larger employers of labour in their own interest's sake to form the initiative in a movement of this description.

As years pass away we miss, one by one, the old familiar faces, the kindly recognition and friendly greeting of old friends. In our obituary we have lately recorded the death of Thomas Henry Carroll, Esq., at the comparatively early age of 53 years. Mr. Carroll's name appears long associated with extensive works under the Ecclesiastical Commissioners, which he continued up to the period of his decease. He has also been largely engaged upon numerous private residences throughout Ireland. One of these, a princely mansion at Kylemore, Co. Galway, is not yet completed. Ever foremost in works of practical benevolence, his name has been associated during a long period with whatever appeared useful or beneficial to those with whom he came in contact. We could adduce many examples of his philanthropic disposition; but are they not fresh in the memory of all who knew him? In conjunction with Mr. W. Hughes and Mr. G. Cockburn, he was the founder of the "Builders' Association of Ireland," the able reports of whose council we have so often recorded in these columns; the first of these (8th September, 1858), caused, in December of that year, without exception the largest demonstrative aggregate meeting

in the Rotundo of the artizan class ever held in Dublin. Every workshop and every scaffold was idle that day. The men mistook the objects of those who have since proved to have been their best friends. It is to be regretted the united exertions of these gentlemen were not more generally seconded by the Builders of Ireland, as after a flourishing existence of about two years an unaccountable apathy appeared to be manifested towards the association, until its monthly meetings dwindled down to the attendance of four or five members. We know the nucleus of this institution still exists in its entirety; and we cannot conceive a more graceful tribute to the memory of the principal founder than its resuscitation. We have often called attention to the utility of such an association, as affording the best possible medium of interchange of thought and mutual diffusion of information among its members, which cannot be too highly commended.

We have given such ample reports of the Phibsborough Church building case, that it is almost needless to refer to it now. It has eventuated, as all are aware, in a disagreement of the jury upon one of the first issues, or rather questions of law to be tried—"the liability of the defendants." After all, we are not surprised at the result, because the Chief Baron, interpreting the law as it is, expressed his dissent to Mr. Butt's opinion of their liability thus, "that the mere fact of the Rev. Mr. M'Namara being head of the Community, and calling himself administrator, in the slightest degree bound any of the Community who did not, in point of fact, give his authority to subsequently ratify the contract." Further on, and during Mr. Butt's address, the Chief Baron says, "I totally dissent, Mr. Butt, from your proposition of law that the mere fact of Mr. M'Namara being the head, and making this contract, in the slightest degree bound any of the persons who did not in point of fact give their authority." This is possibly the law as it now stands; the question of liability would therefore appear to rest upon how far the letters of the Rev. Mr. Dixon rendered him personally liable. We are no lawyers; and while offering no opinion upon the merits or demerits of the plaintiffs' claim, we feel we cannot too highly censure, in a moral point of view, such line of defence, although strictly legal it may be. It is scarcely credible that the principal of a religious community succeeding his predecessor in office, succeeding to the emoluments (we must certainly acknowledge not for his own but for the general benefit), should, where an alleged debt is claimed for works done, which must eventually be of advantage to his community as well as to their congregation, by this means ignore that claim. In these days of religious building, the question is far too serious to the interests of the classes we represent to remain unanswered. If a claim exist at all, even an alleged claim, it should

be met by a totally different line of defence, else there should speedily be an enactment for the benefit of superiors of religious communities, which should be thoroughly well understood by all, specially limiting them to the debts they individually contract, and rendering them not accountable for such as may accrue, for the special benefit of their communities, to act as a wholesome warning to unwary architects and builders.

BELLS.

"Ring out the old, ring in the new;
Ring out the false, ring in the true."

TENNYSON.

APPROPOS of the departure of the Old and the dawning of the New Year, the peal-of-bells mania, which has just now got possession of the public mind, is not an inappropriate theme for the time. Bell-ringing is comparatively little known in this country, while from thousands of steeples in England the old year has been rung out, and the new year rung in by a joyous peal. In this land we only possess a solitary or indifferent peal here and there, to render it possible to give out the exhilarating clangour which broke in upon the sad memories and reflections of the Poet Laureate, and which, indeed, is a sound that is calculated to dispel the mental fogs that are apt to creep about the heart of society, as well as that of the individual. Yes! verily—

"Ring out the old, ring in the new;
Ring, happy bells, across the snow."

But in this country, how few and far between are the towers from which the clash breaks forth! A "lively people" are we, when nearly all our towers are mute; and when even the knowledge relating to the subject seems to have lapsed, or to be at best in a somewhat mystified condition.

There are few towers in this country capable of containing a peal of bells adapted for being rung. It is a singular fact that most of the steeples that contain peals in England do not appear to have been erected with special reference to the matter. If, during the time a peal is being rung in a tower from which a high spire rises, a person will steadily observe the vane on the top, he will see a sensible vibration, which is operating more or less to the detriment of the stability of the structure, and which is hastening its ruin. The disturbing force at work in ringing a peal of bells is something enormous, if the bells be of any size. There are towers containing fine bells, which are obliged to remain fixed and mute, for fear that the ringing of the bells should bring the building about the ears of the ringers. Even in some cases a tower containing only one large bell—as, for example, that of Christ Church, Oxford—has the bell fixed and at rest, the clapper only moving, for fear of a sudden collapse, the structure not having evidently been intended either for a peal of bells, or the enormous single bell placed there, weighing some 17,000 lbs.

Of course when speaking of this bell as "enormous," we mean relatively to *ordinary* sized bells. The great bell of Moscow, cast in 1653, is said to weigh 433,772 lbs.; another in the same city weighs 127,836 lbs. A bell at Nankin, in China, is said to weigh 50,000 lbs.; and seven at Pekin 120,000 lbs. each.

The big bells mentioned are, of course, firmly fixed at rest in the tower, the clapper only moving, or a hammer connected with the clock-work striking the hour. The idea, however, of bells of anything like this size being rung is absurd. That a stroke from a clock hammer, or a blow of the clapper upon bells of large size, produces a deep, rich tone, is unquestionable. But we do somewhat question whether it is necessary to go beyond the heaviest weight of bell capable of being rung, not only because there exists such a critical chance of such bells being perfectly cast, and if perfectly cast, being so very liable to damage, but because the full tone of the bell is lost, and cannot be brought out if it is incapable of being swung to and fro as in ringing a bell.

Bell-ringing is a science, but it ought not be

a mystery. It seems almost silly to attempt to explain how a bell is rung; but it seems really a fact that every second person you meet knows as much as the man in the moon about the matter. A bell to be rung must hang upon a moveable axle, so that it can swing from side to side. Now, to raise a large bell in this way requires a certain leverage, which is obtained by having the axle on which the bell moves the centre of a wheel, to the circumference of which a rope is attached, and which moves in a groove upon the wheel, and by means of which the ringer can "raise" and ring the bell. It takes time and a practised hand to "raise" a bell. It must be done gradually, and not abruptly. The bell has to get into full swing before the full tone comes out. The full tone is only produced when the mouth of the bell is swung up a little above the horizontal, at which instant the stroke from the clapper is given. To ring the bell up to this point without allowing the clapper to make irregular and awkward clashes, annoying or alarming the neighbourhood, requires much skill. It also, as will readily be perceived, requires considerable space in which to ring a peal of bells. Say the average size of the bell is three feet in height; then we have over six feet of space to allow it to swing from side to side. To have three bells of a peal in a row would require, therefore, about 18 feet. There might, of course, be a greater number of rows, at right angles to the direction in which the bells swing. A peal of 10 or 12 might be in four rows, and would require a tower of about 20 feet square on the inside, that is, if all the bells were on the same plane, which is desirable. The frame in which the bells swing, should not be attached to the tower; and the pull and swing of the bells should simply have a resultant force in a perpendicular direction, and thereby the stability of the tower would not be endangered.

We cannot but add a few words in eulogy of the science of bell-ringing, and in praise of the peal of bells. Of course, in so doing, we are only following in the wake of numerous poets and countless writers who have alluded to the bells. Although bell-ringing and guilds or societies of bell-ringers existed long prior to the Reformation, and although the pealing of bells has met with favour from all sects of society, yet there does not seem to have been due provision made for so exhilarating and humanizing a science. Whether the towers of the grand old cathedrals and parish churches in England were designed with this object is very questionable; and it is to be more than suspected that peals of bells are customarily placed there, in order to utilize the space. To build towers expressly for peals of bells is not altogether a frivolous object, nay, seems to be a most desirable means of softening the asperities and promoting the happiness of the age in which we live.

THE STUDY OF ART.

In a recent address to the Female School of Art, Mr. A. H. Layard, M.P., said to those students who intended to follow art as a profession to gain their living, or to help others to do so, "Let me urge on you the extreme necessity of doing thorough good work, of doing nothing carelessly, and going thoroughly through these schools." Unless thoroughly grounded they would never do good work. Young people had a tendency to fancy they could do more than they really could, to imagine themselves artists as soon as they could draw passably, or put in a bit of color. A lady, who was then a distinguished amateur, came to him some years back to ask advice on her course of study. She followed it, and went to South Kensington, but came back to him complaining that the teachers had set her to draw straight lines for two or three days. He told her the story of how Giotto, the great Italian master, when asked by the Pope's Nuncio for an ensample of his skill, simply struck a circle on paper with one vigorous sweep of his pencil; and so pacified her. Some months after she came to him again, and acknowledged the benefit of the course of thorough training. That

eminent sculptor, Mr. Gibson, told him that one day he went into his study, and there found an American physician with his daughter, who, the father said, used to be continually getting hands and feet from his dissecting room and modelling them, and at last insisted on going to Rome, and studying under Mr. Gibson. Now that gentleman did not take pupils, for he found they generally came to teach him, instead of learning from him; but he told the lady to call next day, when he set her to model in clay a bust of Medusa. Next day he went and found an uncommonly good copy; but he thought, "If I tell her it is 'an excellent copy,' I shall turn her head." So he said, "Not bad, but you can do better; try again," and defaced the copy. Next day she did better, and the advice and defacing were repeated. The third day he really was surprised to see what she had done, and took her as a pupil, on account of her spirit of perseverance and willingness to be thorough. She was now a most distinguished cultress—Miss Hosmer—and stood a high chance in the competition for the design of the national monument to the late President Lincoln. After his hearers had mastered first principles, he would urge on them to turn to the cast, and particularly to the study of the human figure. Once mastering that, the eye could never go wrong. The better they drew from the cast, the better designers they would be. History showed that the very greatest designers of ornament were very great painters—Raffaello and Benvenuto Cellini. But even when they could draw from the cast, they must not throw off selections, and plunge into picture-galleries to select for themselves; for instead of doing good, our museums and picture-galleries were really likely to do harm to pupils' tastes. Unless a museum was correctly and scientifically arranged, it did not point out what was really good and useful in art, and what was only curious and interesting on account of the epoch in which it was produced. In the British Museum statues and basso-relievos were mixed up without much discrimination; a little was done, but even the most practised observer, not an intelligent connoisseur, would get misled. The same thing existed in the National Gallery when works were arranged chronologically: a chapter of the history of the human mind, of civilisation, of progress, was presented to the eye; but it did not follow that what was merely curious was admirable as a copy. He would further advise them not to begin art as a trade too soon; to pursue art, even when at the head of domestic establishments, to hold together and help others taught in the same institution, and let the school form a nucleus around which mutual interests should be developed. He was glad to see the attention they were giving to designs for manufacturing purposes. Mr. Samuelson had stated, in a recent work on technical education, that, in consequence of the influence of the School of Art at Nottingham, the laces of the town were not only equal to, but superior in design over, those of all Europe. He was sorry to hear that the study of wood-engraving had ceased in the institution, for he believed it would furnish an important branch in art for the exercise of female talent. Some of the past engraving produced in the school need not fear competition, and literary men especially might be of service to those who took up that branch of labour. He cautioned them against a false tendency to heaviness in shadows very much encouraged of late by certain works from the other side of the Channel, which, though "taking," was not good art. He urged them, as much as possible, to study from nature, and to study also modelling, which would teach them an accurate knowledge of form. He wished that they had better models, and that the patrons of the institution would lend, whilst they were out of town, pictures of value to serve as copies to the students. To amateurs he pointed out that art taken up for pleasure might be made to turn to a thousand beneficent purposes; that it meant usefulness, and, to the enjoyment of that, happiness—the enjoyment of the beautiful—the greatest and purest of all enjoyments.—*Builder*.

CORK SCHOOL OF ART.

THE annual distribution of prizes to the students of the Cork School of Design took place on the 21st ult., in the Athenæum. His Worship the Mayor presided. We are happy to state that many of the subjects on view displayed not merely an improvement on the performances of the previous year, but exhibited in many cases a power of design and execution of a positively high order. Amongst those more particularly worthy of notice were, a "Study from Still Life," by Mrs. Henry Hill, finished with remarkable fidelity to nature, both in drawing and color. In this category Miss Anne Baker and Miss Maria Thorpe exhibited some exquisite studies of fruit and flowers. In the department of portraiture from life, Miss Kate Bleasby exhibited some really beautiful productions. Miss Baker and Miss Fanny Thorpe were also very successful under this head. Among the most attractive pieces on view was a frieze from the Parthenon, by Miss K. Bleasby. An Apollo, in monochrome, by Miss Sarah E. Wood was also deservedly admired. Under the heads of Architectural and Mechanical Drawing, Mr. Charles W. Adams exhibited a design for a Town Hall (prize). Mr. P. Meade exhibited drawings of machinery. Some bold life studies after Mulready, exhibited by Messrs. Coombes, Leslie, Franklin, and McGlennen, attracted much notice. The freehand drawing was of unusual excellence.

In commencing the ceremony of the evening, the master, Mr. J. Brennan, read the following report:—

Mr. Mayor, ladies and gentlemen,—I have the honour to submit the report for the School of Art for the last twelve months. During the past year the total number of persons receiving instruction in the Central School of Art has been 187, being a slight increase over the number attending previous year; in addition to which the children from the National Schools, St. Stephen's Bluecoat School, &c., continue to receive instruction either in their own schools or at the School of Art. The Department examination in freehand drawing, geometry, modelling, &c., were held early in the month of March. About 56 persons presented themselves for examination, of whom 29 were successful, being an increase of 9 over the number last year. Two of the students, having passed in all the subjects of the "second grade," received their certificates. A considerable number of advanced and elementary works were sent up to the annual competition in London. The Department reported favourably on the character and rendering of the works sent. The works of thirteen students were selected for national competition—two received "honorable mention," and three students received their grade prizes. The committee desire to record their sense of the continued liberality of the Earl of Cork—by means of which they have been enabled to remunerate the pupil teachers for work done in National and other schools. They would also wish to thank his Worship the Mayor, for his having, for the third time, contributed largely to the prize fund of the school, and which has enabled the committee to reward many of the students for the diligence and attention they have shown, this incentive to study comes the more opportunely, at a time when the Department has considerably diminished the number of prizes awarded to schools of art. This munificence on the part of his worship has also been kindly supplemented by a member of the committee, which has enabled prizes for modelling, &c., to be awarded. Amongst some of the recent changes made by the Department of Science and Art there are one or two I would wish particularly to draw attention to. The first is the creation of "free studentships," to which any student who is an artisan, draughtsman, designer, &c., may (after the annual competition in London, if his works are of a sufficiently high character) be appointed; this gives free admission to all the classes of the School of Art for one year—the Department paying his fees. At the last examination, six of our students gained this distinction; their names

are Patrick Meade, Patrick O'Keeffe, John Coombes, Luke Franklin, James Griffin, and Charles W. Atkins. The free studentships are renewable from year to year. Another advantageous change is the creation of a collection of oil and water-colour drawings as examples; these are lent to the Schools of Art throughout the kingdom, three or four at a time. This arrangement will keep a constant variety of work before the student, and the high character of these (chiefly original) drawings may be expected to operate favourably on the work done in the schools. We have already availed ourselves of the privilege of borrowing from this collection. In conclusion we can only express a hope that all classes will avail themselves of the many advantages a School of Art offers, and that at our next distribution, we shall have if not more at least as many successful students.

The Mayor then proceeded to distribute the prizes (a list of which had been read by the secretary), and afterwards addressed the meeting. He referred in strong terms to the withdrawal of the government grant from the school. It was gratifying to see, notwithstanding the disabilities and disarrangements under which it laboured, the Cork School of Design progressing so satisfactorily. It was gratifying to see that the inhabitants of the most intellectual city in Ireland, true to their character, still fostered their taste and love of art—art which is the religion of the intellect, which it refines and elevates as the religion of the soul purifies and elevates the spirit. Art was the mark of civilization, and wherever it appeared should be protected and stimulated as a welcome sign of human progress.

DERRY.

It is no empty boast to say that Derry has been making great progress during recent years. We (*Sentinel*) have been called upon from time to time, in the exercise of the duty which we owe to the public, to chronicle the particulars of a variety of undertakings which clearly indicate improvement. To meet the increasing demands of the community, to whose numbers large accessions are made each succeeding year, new streets are being formed in a every direction. Only a few months ago we noticed the completion of the spacious new markets which extend from Market-street to Linenhall-st. These markets, which, we understand, will henceforth bear the name of "Sir Edward Reid, Knt.," during whose mayoralty they have been erected, are now tenanted by many respectable traders. The stalls presented a cheery appearance on Saturday night; they were well stocked, well-lighted, and buying and selling were actively conducted until eleven o'clock. The market accommodation of Derry is not excelled, we believe, by any city or town in Ireland, not even excepting the metropolis or Belfast. For the erection of the new premises the Corporation deserve the thanks of the commercial community of this City, as well as of the farmers of the adjoining districts of the counties of Derry, Donegal, and Tyrone.

The local merchants are men whose spirit of enterprise is scarcely less conspicuous than that of their brethren in the commercial metropolis of this country. In the erection of building, both of a public and private nature, they take a prominent part. The three magnificent blocks of stores which have just been completed in William-street, by Messrs James Corscaden & Co., are now deserving of notice. This firm is in possession of considerable house property, but their latest efforts in architecture are amongst the most conspicuous in this city. The new stores rise to a height of four storeys, and present a frontage to a new street of nearly 600 feet. Workmanship of the most substantial character has been displayed in the erection of the buildings. The exterior of the walls is relieved by cement quoins and base courses, and by string courses of white brick, which make the general effect most imposing. Messrs. Corscaden & Co. have also erected, near the stores which we have briefly described,

five large houses, three storeys in height, with shops and attics. The total outlay on these works amounts to about £8,000. They have been ably executed by Mr. D. Gamble, builder, London-street, from the plans and under the superintendence of Fitzgibbon Louch, Esq., C.E., of the firm of Messrs. Louch and Wilnot, architects, Derry and Dublin. We understand that several of these buildings have already been leased to various tenants, and that, in order to complete the range, Messrs. Corscaden contemplate erecting five additional houses in the same street.

ROYAL INSTITUTE OF THE ARCHITECTS OF IRELAND.

THERE was an ordinary general meeting of the Royal Institute on Thursday evening, the 17th ult., Parke Neville, C.E., M.R.I.A., V.P., in the chair. Other Fellows present:—E. H. Carson, Charles Geoghegan, John M'Curdy, V.P.; S. Symes, Treasurer; T. Drew; J. H. Owen, M.A., hon. secretary. Associates:—W. Doolin, J. M'D. Bermingham; T. Early, C. H. Brien, F.R.G.S.I., assistant secretary. Students:—D. Freeman, R. L. Robinson.

Mr. James H. Owen, M.A., Fellow, hon. sec., read a paper, entitled—"Imitation," for which he received a vote of thanks, and which was referred to the council for publication.*

It was announced that Sir Thomas Deane, R.H.A., had consented to act as president for the next five years; and that the subject for discussion at next ordinary general meeting would be—"Cheap Dwellings for the Working Classes in Town and Country."

COMMUNICATION WITH FRANCE.

THE Dover to Calais tunnel appears to approach the land of realities, as part of this vast system of intercommunication. A joint commission, acting on reports of Mr. Hawkshaw, has, we are informed, advised that the only possible step by which certainty can be obtained as to the practicability of a tunnel in the only practicable way yet proposed by any one, namely, that of an ordinary tunnel-lined excavation, made at a great and sufficient depth under the Straits of Dover, should be taken at the joint expense of the French and English governments. This is to endeavour to make, in the first instance, a drift way or little experimental tunnel along the intended line of the actual one. The capital need for this, viewed as an affair for two such nations as France and England, would not be too large: it is admitted that it may be in part, possibly in great part, totally lost, and with it the lives of the men at one or other heading; but the object is a great one, and warrants a good deal of risk both of money and men.

Many projects, some very recently, have been broached, mainly by amateur engineers, for bridging the Dover Straits. In the mere mechanical sense this is certainly not impossible; but as regards the effect upon the navigation of the straits, especially at night, and upon the tidal stream, we believe any bridge may be put aside as really impracticably unadvisable. A far more feasible scheme is that of running out two very long moles from either shore, five miles perhaps each,

with a sort of **W** shaped dock at the extremity of each, out of and into which, huge steam vessels should run, carrying the railway trains upon their decks, or rather in the interior of their hulls, upon a lower deck, and under cover. With a prodigious mass of rascality loose in the shape of *forçats* and convicts in both countries, it is hard to see why these moles should not be executed in effect without any cost to either nation, which must take care of these criminals whether idle or at work.

A vast ship of this sort, quite as long and broad as the *Great Eastern*, is at the present time seriously contemplated, if not something more, in the United States.—*Practical Mechanics' Journal*.

* This paper will be found on page 4.

IMITATION IN ARCHITECTURE.*

THE banished Duke in the play could find "sermons in stones:" let us try to-night if we cannot find some Moral in bricks and mortar; let us see if our art has not an ethical side, and whether some hints tending towards practical good may not develop themselves from a brief study of one of its purely mental aspects.

"Imitation" is a word very commonly used in a bad sense as a mere euphemism for "sham." The word imitators, when used absolutely, generally implies the "vile pecus;" but we must not forget that every vice is, in one sense, a distorted virtue—a good and laudable thing turned to bad ends; and that as there is a right way and a wrong way of using everything and doing everything, so the natural impulse which leads men to imitate, can only be wrong in so far as the application and use of it are made to an improper extent, or in a faulty direction: and this is the argument of what I propose to bring before you to-night—viz., that the mere action of imitation, apart from qualifying characteristics, is perfectly neutral and indifferent—neither good nor bad, but of the two, rather good than bad, as being the use of a power natural to us; and that the quality of goodness or badness must be stamped upon it by the right or wrong exercise of it.

Perhaps no power has been conferred upon us which is so direct and efficient a means of education as the instinct which leads us to imitate. It is the foundation of all our knowledge. It trains us in the use of all our faculties—mental and physical; it brings us by the shortest way up to the level attained by those who have gone before us, avoiding the unnecessary labour of each man reinventing for himself all the knowledge and technical contrivances of his predecessors; and fits us to start onwards to further development, so as to become in turn the object of imitation by others. We all imitate as naturally, and often as unconsciously, as we breathe. Without imitation life would be mere obstruction—formless, colourless—mere existence,—only to be paralleled by the life of a toad imprisoned in a rock, which in its abstraction from all acts, all motion, all life—we can barely imagine but cannot realize.

Imitation being thus a law of active life, it must necessarily pervade all Art—itself, in most of its branches, essentially imitative; and this is especially the case in Architecture—the parent and mother of all Art. We cannot, with anything but a very distant approximation to truth, assign any particular sort of architecture to any particular people as the inventors of it. What we call by the names of Greek, or Roman, or Egyptian architecture, are themselves in each case developments of a something that went before, from which by imitation and improvement they have each arrived, by many stages, spread over a considerable interval of time, at that which we habitually designate by the adjective describing the locality, or nationality, or period, which forms the central point at which it is most itself, and retains fewest traces of its early origin, and shews the least signs of a later development to which we assign another name. The word Greek, applied to architecture, is used to condense in one word the history of the Civil Art of the Greek States, from that early prehistoric dawn when, as yet, what was to become Greek was to be found on the banks of Euphrates or Tigris, or the well-watered plains of Mesopotamia—that Aram from which the father of the faithful was then setting forth on his life-long pilgrimage—down to that period of gloom and decay of all real art, when Greece became part of Rome, and her Art became the slave-mistress of her conqueror; but though ruling supreme in her proud beauty, the noble soul that once animated her was gone—the chain had murdered it; the pure virgin had sunk into the Hetera. The chaste and often stern and severe matron of old was scarcely to be recognized in

the bedizened harridan flaunting it in the streets of Rome, or sinking in her old age under the blows of the wild sons of the desert. And in all this long story of 3,000 years of development, from infancy to maturity and decay, there is no pause—no break in the chain but what has been made artificially. The name is only, as it were, the glass by which we gather into one focus the rays of its greatest light; but if we trace and study the history, we shall find no one generation so isolated as our ordinary language would imply,—no one man or one generation inventing for itself those glories of art which all time delights in; but we shall find at every point a something almost the same that preceded, and this something only slightly differing from what succeeded it, as night imperceptibly melts into day and again fades away into night; so with sundry sudden flashes of irregular light, and several premature and temporary eclipses, did the architecture of the Greeks proceed on its long career. Our putting out of sight its beginning and ending no more puts them out of real existence than does the invisibility of the shooting star, during its period of obscurity, do away with the fact revealed to us in its one flashing moment of existence, when in one and the same second it enters and leaves the narrow limits of our power of seeing, of its long eccentric course through space illimitable. Every day of Greek architecture had its yesterday and its morrow: it borrowed from the one and gave to the other. It imitated, and was imitated in turn; and having fixed and settled this fact in this one case, it will not be difficult to show that the same thing has occurred in every style of architecture which bears a distinctive name. Let us endeavour briefly to trace this out in that more modern style which bears among us the names of Mediæval, Christian, Gothic, but which I am disposed to think would be much better and more accurately described as Tentonic. Let us summon to our minds the ideas conveyed by the words—Saxon, Norman, Early English, Decorated, Tudor, Jacobean. The enumeration makes one think of toiling up a hill with the high hopes and aspirations of youth, only to go weary and sad down the other side of it, into the decrepitude of a dishonoured old age. In this progress, every step or stage of which is illustrated by still existing buildings, is there any point at which we can pause and say—"this is purely original; the author of this building has invented his style?" Does not, on the contrary, every building contain some parts in which the thoughts of the designer seem to linger in the past, while in some he seems to anticipate what is usually future, even when extrinsic evidence assures us that we are looking on the work of one man? Does not every building also demonstrate that it has been imitated from some other example or set of examples preceding it? and does it not in its turn become the exemplars from which others are copied? In what, then, consists the vice of imitation? If it be natural, and not merely natural but indispensable, unavoidable—an inevitable stage of all art, and in many of the applications of art its absolute final aim and object—in what way and by what steps does it degenerate into a vice? I think we shall find, on considering the matter a little, that there is a two-fold tendency to evil, arising from corresponding evil tendencies in the mind of the producer, viz., the art, if we can rightly call it so, which is infected with laziness, and that which is defective in honesty. I pass over, as outside of my subject, and condemned in its very nature, all art which is on the face of it and intentionally devoted to the service of the devil. With that I have nothing to do: there can be no controversy about it. Its proper destination is, to be treated as the lawgiver of Israel treated the golden calf at the foot of Sinai, "to burn it in the fire, and stamp it into powder, and strew it upon the waters, that it should no longer pollute the face of the earth."

The first evil we have to notice is, when art is infected with laziness, when imitation is followed as its own end, as when a student

contents himself with making accurate copies of his masters' works, and stops there and rests satisfied. The true end of imitation is to acquire the materials and power of producing. The true student imitates that he may become original; he copies in order that he may design: and it is only the lazy, the despairing and the half-hearted, who are content with less. The true poet* is essentially a "maker:" the true artist is essentially a "contriver." This proposition requires little or no proof. It requires very little reflection to perceive that, in the first place, no high degree of excellence can ever be attained without a passing out of and beyond the state of mere imitation. Excellence implies superiority; the utmost height of mere imitation is equality. "Excelsior," in spite of the badness of the Latin, is the true artist's motto; and next, if even a sort of excellence should be attained, to rest and be thankful therein for ever is to abandon art, and in process of time it will revenge itself. Slowly but surely the original types will be departed from, in consequence of copy after copy, in degenerating succession, being made from each other, as may be seen by comparing the sculpture of the Roman Empire with that of the age of Pericles, or 16th century statuary with that of the 13th; or in any modern gentleman's collection, by comparing his pictures from the manufactory in the Roman shops with the real works of the masters whose names they bear. Perhaps the most curious and instructive example is that afforded by Chinese art, which shows the perfection of execution and material, combined with an invention stopped short and stereotyped at the nursery stage of development. It is laziness, cowardice, and half-heartedness carried to their highest pitch, until those qualities, or vices, have become the national habit, and hold the national mind in a slavery which generations of foreign intercourse will not shake off, aided as it is by the conceit always engendered by narrowness of ideas, or limited sphere of intercourse; like as the youth who is merely home-bred is always at once bashful and conceited, shrinking from external intercourse, and yet fancying himself superior to those he is likely to meet.

The second evil, the imitation which is defective in honesty, is that which employs itself in endeavouring to deceive—in the manufacture of shams. Now, a sham is that which pretends to be what it is not—the false coinage of art, æsthetic hypocrisy. This has its heights and depths, just as there are hypocrites of all ranks; the one common feature is the dishonesty of it. In architecture proper, it is the tendency rather than the result that generally meets us; the intention is most common, and its successful carrying out very rarely achieved. Most shams are like the tricks of a pantomime on the first night of performance—every one can see through them, and yet every day they are practised, and from force of habit are even approved by some people. This age of ours is much more sensible and realistic than its predecessors; and we have almost seen the last of heathen temples and Christian churches being made to do duty for every imaginable purpose, and sundry other notable malpractices of the same kind. But we have a host of shams still amongst us which we ought to endeavour to abolish, all having their foundation in conceit and vanity, not restrained by moral purpose. We too often still endeavour to get credit for stone, when our purses will only afford a cheaper material, and then we try with paint and every sort of artifice to make our plaster, or our wood, or our cast-iron pass for a costlier material, but in vain; the uniformity of tint in one case betrays the sham—it is too perfect; just as the beggar detected the would-be Athenian by the over-nicety of his phraseology. The wood will not bear the honours we thrust on it, without betraying its awkwardness in its uncongenial position by unseemly twists and shakes; and even the iron blushes red

* Read at Ordinary General Meeting of the Royal Institute of the Architects of Ireland, by Mr. J. H. Owen, M.A., Fellow, hon. sec., December 17th, 1868.

* Ποιητής from ποιεῖν, to make simply. Τέχνη from τεύχω, to make with the sense of arranging, forming, combining.

at and so betrays the imposture it is unwillingly forced to be an accessory to. Another most false and empty sham is shown in the practice, still very common, of dressing up an exterior to the impoverishing of the interior—in many cases without any regard to the interior: “Starving the belly to clothe the back,” as the proverb has it. This is vulgar imitation of one’s betters; truth has room to exhibit itself in the hovel or the palace, in the shop, the warehouse—in every building,—but each in its own grade and order; not making the hovel a miniature palace, nor appropriating to any one the forms and ideas belonging to another, thereby vulgarizing them without producing a satisfactory result. The foundation of error in this direction is generally the striving after the ornamental. An architect or his employer wants something pretty, and to meet his views it must be pretty on paper; and so all times and all climes must be ransacked for details to make a pretty picture, which probably results in execution in a sort of toy house, calculated to catch the fancy of the passer-by, for which gratification its owner has in many instances to pay the penalty of distortion of internal accommodation, and every imaginable discomfort. But there is also a contrary error to this silly and insane hunting after prettiness, which, while pretending to cultivate simplicity, substitutes for it an unmannerly rudeness and coarseness of detail. Of the two affectations, I do not know which is the most disagreeable. I can only compare them to two men, the one of whom drives you into indignation, while he insults your common sense by a flood of hypocritical compliments; and the other keeps you in a perpetual fever by carefully and heavily treading on any mental corn you may be troubled with. I think architects would find that, in the long run, “honesty is always the best policy,” and if they would honestly think first and chiefly of the building, and secondly, if at all, of themselves, they would make fewer mistakes in design. It is by preferring themselves to the building that they are so often led into shams, incongruities, and affectations. I wish I could quit general terms, and illustrate the views I wish to enforce by reference to executed work; but as I cannot do so without violating the law of charity, and probably producing an effect much more serious than I at all intend, I refrain; but I would just lay it down as a general rule useful in judging of executed work, and therefore most useful as a guide in designing, that after judging of the main form and outline of any building, if we analyze its ornament, and in our mind’s eye reject all that is not doing real work in marking the absolutely necessary features, or relieving blanks, or in some way contributing to and heightening the general effect, we shall find that all that a sound judgment would so reject is sham work, however beautiful it may be in itself; and although at first sight this rule may seem of a very harsh and sweeping character, yet its justness will be apparent to every one who will candidly apply it to any known building. I will only instance the Houses of Parliament at Westminster. How much more striking would be the ornamentation of that building if only there were less of it. How the eye longs for some bit of plain walling on which to rest. Does it not suggest, as the ruling idea of it, the ostentatious vanity arising from the unaccustomed possession of unlimited resources—architecture swallowing pearls?

In the accessories of architecture, imitation is a rage. If the architect has been ever so virtuous himself, if he have completed a building that is faultless in its purity of detail and truth of design, his whole work is probably marred by the accessories, by which it is finished and—done for. An ambitious painter and decorator will destroy his plaster cornices by painting the enrichments after life, and introducing sham ones where, to his ideas, the architect has been too sparing. A sham watered silk, bordered by satin ribbons, with impossible effects of light and shade, is placed on the walls; or probably a collection

of birds, beasts and fishes, in most extraordinary combinations, with botanic specimens from every land and every sea. These are all imitations of hangings of arras, or needlework, and are probably never intended to deceive; but the mind must be at the lowest ebb of either taste or common sense that can find pleasure in the effect produced by them; whereas the same things, if real, would have an effect of the most charming character. I remember some years back being at one of Alfred Mellon’s promenade concerts at Covent Garden Theatre, when the back and sides of the stage were cut off by screens covered with white calico, on the centre of which was attached a bouquet of pink roses; the effect was exceedingly pretty, but an imitation of it would have appeared tawdry in the extreme. Sham oak walls, and the whole art of graining, I look on also as the vilest of abominations, coupled with stupid extravagance—a vanity and a vice all in one. By encouraging and patronizing them, we are taking men who would probably have been honest, decent workmen, and setting them to spend their lives copying a panel of oak or mahogany, or some pieces of marble, such as nature never made; and then the poor wretch is puffed out with conceit, and must get his two guineas a week as a “superior artist;” and after all what does he give for his extra wages that would not be got as effectually by a mere tint rubbed down and varnished? Stand a couple of yards away, and what becomes of the graining? The streakings of combs, the rubbings of bits of dirty cloths, the washes of water colour—all are blended into one general effect, not to be distinguished from that which would be produced from a self colour.

The marble-worker is about the last man who would be supposed to deal in shams; but trickery and deceit get mixed up even in this. The Belgians, I am told, improve the patterns of their marbles by paint, and their surface by French polish! I rejoice to say that our townsman, Mr. Sibthorpe, is now sending out true, genuine work in Irish marble, of some dozen different colours and patterns, that need not be ashamed or afraid of association with any foreign work, and which is genuine as nature put it together, without any patching or making up; and as this trade is not now dependent on the chances of half-opened quarries, and work turned out by ignorant, hand-to-mouth craftsmen, without skill or resources, it is to be hoped that we Irish architects will not let the manufacture only be patronised by Englishmen—that we will not let all our patriotism exhale at the hustings, but keep a little of it for the ordinary business of life, especially when by so doing we are conferring a benefit on our employers, by inducing them to do that which abolishes for ever the paint brush, and its periodical stench and abomination, and at a cost not so much exceeding the price of a carefully completed sham.

There are strata in society where the natural and laudable desire for putting the best face on things leads to the adoption and even admiration of imitations, that set us wondering at the unseen depths in human nature which they reveal to us. Poor Dick Swiveller was only making a dreary joke, when he remarked to the marchioness that the “marble floor was sloppy.” But what a depth of undeveloped nature was betrayed by her description of wine made out of orange peel and water—“and it’s really very nice, if you only make-believe ever so much!” This is too sad to laugh at. How often do we not find its parallel in buildings, when we architects have racked our brains, and have succeeded in producing a noble, true building, worthy of its destined use. How often do we find its whole effect marred by the introduction of specimens of art too bad even to smile at. Simply as an architect, apart from all specialities of creed, I cannot refrain from mentioning the wretched, miserable apologies for art we see exhibited in the religious shops and in our places of religious worship—the miserable daubs of French prints, the vile plaster casts, the wretched work in brass and

earthenware—things one would scarce tolerate on the walls or mantel-shelf of a hovel, and which require so much “make-believe” to fancy them art at all. How terribly childish yet unchildlike must be the turn of mind that tolerates such things! And this sort of thing is not confined to any one set of religionists. I frequently pass a window in — (I won’t mention the place), filled with cheap art furniture, suited to the partially developed minds of Protestant ministers; and it is a painful fact that the things are bought, and, without any make-believe at all, but in all sincerity and simplicity, admired.

But to wander back to and wind up the subject, what I want to lay down is, that imitation is an effort of nature, and as such right and proper, when rightly and properly directed and within due limits. That true imitation leads us to acquire the knowledge and art of others only as a means to an end, while false imitation keeps us there as our sole end. While the true, never satisfied—restless from consciousness of weakness that may be strengthened, and ignorance that may be enlightened, impatient of present powers and acquirements, ever pushes on; like the Moorish conqueror of the Jewish settlers in Spain, who had got possession of the golden casket of Solomon, in which tradition stated was enclosed the secret of his marvellous powers. The casket was the perfection of workmanship, and the impatient curiosity of the Arab would not let him rest without opening it, when on doing so he was rewarded by finding that it enclosed a casket more precious still. In spite of the warnings and horror of his Jewish captives he insisted on opening this, when a third was discovered, more a miracle of art than its predecessor. Encouraged to persevere he opened this third, and found a fourth; and so on till he arrived at the twenty-fourth, and that had nothing in it except the lesson that its emptiness gave—the old lesson of the Preacher—“*Vanity: all is vanity.*”

A NEW SYSTEM OF LIGHTING HOUSES.

A new system of manufacturing gas and supplying dwellings therewith is now in course of introduction into Canada. The process, we believe, owes its origin to American ingenuity. We are so habituated to connect the manufacture of gas with furnaces and coke-producing ovens, that it will astonish our readers to be told that no fire is used in any form to produce the new article. On the contrary the works are immersed in water, and seemingly the only trouble will be to keep out the frost. We may tax the credulity of our readers when we assert that in order to secure a supply of gas extending over twelve months, all that is necessary is to make the receiving vessel roomy enough to hold the requisite quantity of the raw material. That material consists of the refuse of petroleum works, and is known as gasoline. Its value hitherto has been slight. The works consist of a strong cask, some eight feet in diameter by ten feet in depth, inside of which is another cask, some three feet in diameter by the same in depth. The smaller vessel is raised to the level of the larger one, which is filled with water, and rises a few feet above the surface. An outside sheet iron case, like a miniature gasometer, covers the large cask, and can be elevated to hold the quantity of gas proportioned to the works. The piping is similar to that employed in ordinary gas-works. The natural inquiry of any who see the simple machinery we have described is to know how the gas is generated. The process is the simplest imaginable. A pipe, with the end perforated, enters the smaller cask and reposes at the bottom thereof. At the other extremity, and outside the works, the pipe is connected with an air-pump, and when the smaller cask has been filled with gasoline, and the atmospheric air is injected through the pipes, it rises through the gasoline in the form of bubbles—in other words the atmospheric air, being forced through the gasoline, assumes the nature of gas, and that gas

burns as brilliantly as that produced from bituminous coal. It is obvious that the cost of lighting a house is reduced to a minimum when all that is needed is a barrel of gasoline and an air-pump. The invention will be of inestimable service to country villages and individual proprietors, as the cost of lighting premises will be less than entailed by candles, coal oil, or coal gas, and the risk of explosion must be very much diminished in consequence of the mode of manufacture. We believe that gas made in the manner we have described is inodorous. This may be considered as an objection, as an escape cannot be noticed with the same certainty as with the odorous coal gas. We have thus almost a certainty of cheap light at a cost much below what that essential article now entails upon us.

MECHANICAL ARTS.

UNDER the above head we propose to describe some of the processes and principles required in the construction of machinery. We do not pretend to exhaust the subjects treated on, but merely to lay before our readers an intelligible account of the ordinary manner in which machines are constructed. In order to make our descriptions as plain as possible, we shall introduce woodcuts wherever required; and though our treatment of the matter will be of the simplest character, we expect that it will be found to contain much useful information.

IRONFOUNDING.

Ironfounding is one of the most important of the arts, as cast-iron forms part of almost every structure and machine used in manufactures. Pig-iron admits of being reduced by heat into the molten or fluid state, and, while in this condition, of being run into moulds of any required shape. It is this valuable property, combined with its strength, which renders iron so extremely useful for machine framing, as the molten metal can be run with such ease into any desired pattern.

Though iron is fusible, it is so only at a very high temperature (higher than any other metal except platinum), and requires for its fusion a concentrated fuel known as "coke." This coke is not the same as that sold at gas-works, but is specially prepared for this purpose. Founders' coke is prepared from the purest coal, by charring or slowly burning the volatile matter out of it. It is sometimes burned in heaps, but generally in ovens. When burned in heaps it loses about one-half, and when in ovens about one-quarter of its weight. In whatever way burned, the air is always almost entirely excluded during the process. The heat the oven retains after one charge is withdrawn, is sufficient to burn the fresh charge put in, so that in preparing coke from coal there is no expenditure of fuel, unless the oven is allowed to cool between the charges. It takes about forty-eight hours to burn each charge. The coke, when thus prepared, is hard and dense, and has more the appearance of a metallic substance than of a fuel. It will sustain a great weight of iron in the furnace, will last a long time, and acquires an intense heat when supplied with an enormous quantity of air.

It is calculated that Ireland has in possession as much peat bog as would produce about seven thousand million tons of dried turf. If, instead of being dried into turf, this quantity of bog could be converted into a fuel possessing the properties of coke, by any inexpensive process, its usefulness and value would be greatly increased, and the benefit resulting to the manufactures of the country would be very great. It was custom-

ary at one time for smiths working in inland districts to use charred turf for their forges instead of coal. The turf was prepared by being half burned, and then either slacked with water or else covered up with earth.

When coke is prepared from coal, very little air is admitted to it, but when the coke is burned an immense volume of air has to be driven through it. The blast driven through the coke is sometimes obtained by introducing a jet of steam or hot air into the top of the furnace; but the ordinary method is by using a blowing-machine, or fan driven by a steam-engine. The annexed figures represent a form of fan in very extensive use; and though there are many professed improvements on this machine, there are some practical men who affirm that it is equally as efficient as any of the more recent patterns; at all events, it may be taken as a fair representative of this class of machine. Figure

Fig. 1

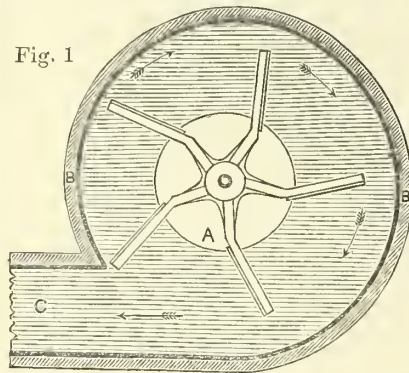
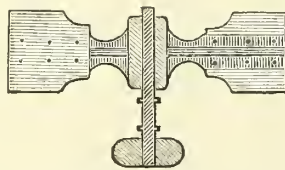


Fig. 2



1 is a cross-section of the spindle, arms, and case; A is the aperture through which the air is admitted. There are two of these apertures, one at each end of the spindle. B the casing, and C the exit pipe leading to the furnace. It will be seen that the ends of the blades nearly touch the casing at B, near the exit pipe, in order that as much air as possible be delivered into the pipe and not carried round with the blades. Fig. 2 is a longitudinal section of the spindle and driving pulley, and shews the shape of the blades and the manner in which they are rivetted to the arms. There is one paradoxical feature connected with this fan, which is—that the greater the resistance in the pipe C the more rapidly will the fan revolve; or in other words, the less resistance received by the air in its passage through the pipe C, the greater will be the power required to keep up the velocity of the fan.

CIVIL SERVICE LITERARY SOCIETY.

A LECTURE on the "Scientific Theories of Harmony and Contrast in Colour as applied to Furniture and Dress," was delivered before the above Society, at the rooms, 212, Great Brunswick-street, on the 14th ultimo, by Mr. Charles H. Brien, F.R.G.S.I., A.R.I.A.I., of the Architects' Department, Board of Works, one of the honorary secretaries to the society. The lecturer, having called attention to the order of the colours in the *prismatic spectrum*, and having explained the meaning of the terms "primary," "secondary," and "tertiary," as applied to colours, proceeded to demonstrate by a series of diagrams what

have been called "simultaneous" and "successive" contrast; and finally applied these natural laws (which seem to be confirmed by repeated experiment) to the question of the decoration of theatres, picture and sculpture galleries; and in domestic buildings; to carpets, hangings, papering or tinting of walls; and the relation which should exist between the covers of articles of furniture and the colours of the woods of which they are constructed; and finally shewed how the same laws applied to the uniforms of troops and the dress of ladies, in the latter case exemplifying the modifications in effect caused by the various types of complexion which obtain.

PROGRESS IN BELFAST.

THE building trade in Belfast has never, we understand, been more brisk than in the year which has just closed. Within that period the Improvement Committee passed plans for upwards of 2,000 houses. In the suburbs of the town whole streets of houses, adapted for the working classes, have been built. We give a few particulars as to the more important structures erected, some of which have been already noticed in our columns.

The New Provincial Bank.—Amongst the finest buildings in Belfast must be ranked that almost completed in Hercules-place for the Provincial Bank of Ireland. The building, even on the most minute examination, does credit to all concerned in its construction. The site, however, is not a very desirable one. The style of architecture is pleasing, being a combination of different orders, well blended together. The stone used was obtained from the Cookstown quarries; it presents the appearance of white marble, and is very durable. The building has a frontage of 84 feet, with a depth of 80 feet. Messrs. R. & H. Fulton are the builders. Mr. James Gargan acted as clerk of works. The design was by the late W. J. Barre, Esq., and has been carried out under the superintendence of Messrs. Turner and Williamson, architects. The stone carving was executed by Mr. Barnes. The cost of the entire will be about £25,000.

Mr. Girdwood's New Warehouse.—This fine warehouse is built in Bedford-street, close to the Ulster Hall, and almost competes with it in size; in fact there are fewer more massive-looking establishments in Belfast. The building is of brick and cut stone; the front, of course, being more extensively ornamented than the sides. Around the doors and windows the stone work is tastefully introduced, the front entrance especially being of a very pleasing design. Every part of the building appears to have been constructed in a most substantial manner. The builder was Mr. Henry.

The New Masonic Hall.—The foundation stone of this building was laid on the 24th of June last, and it is now considerably advanced. The new hall will consist of ground, first, second, and third floors, and have a frontage of 170 feet towards Arthur-square, and 70 feet towards Ann-street. The lower portion of the exterior of the building from the ground to the level of the first floor windows, has been executed in sandstone from the Cookstown quarries. The remainder will be faced with white brick, with ornamental dressings of sandstone. Messrs. Lanyon, Lynn and Lanyon are the architects, and the builder is Mr. Thomas McKeown. The probable cost of the building will be £8,000.

The Ulster Brewery.—The extensive concerns of the "Ulster Brewing Company" are situated in Sandy-row. The foundation-stone was laid on the 14th of March, 1867. The building occupies three sides of a quadrangle, the centre being an open square, with footpaths all round. The centre building looking from the street is substantial and ornate in appearance. It is built of brick and cut stone, with a main entrance of very handsome design. The frontage is 240 feet, and the depth from front to rear is 412 feet. The front range of the building shows the end of the malt-house, the brewer's house, the end of the grain store—150 feet long by 20 feet wide, and in three floors. A. McAllister, Esq.,

Chichester-street, was the architect; the builders were Messrs. Fitzpatrick, Brothers, Great Victoria-street. The engine and boiler were supplied by Messrs. Coates & Co., Lagan Foundry, and the shafting by Mr. Murdock, Great George's-street. The cost of the establishment is—For buildings, about £17,550; machinery and utensils, about £10,000; and other items will bring the total up to about £35,000. The entire of the water required in the brewery is obtained on the premises from the far-famed Mundays' Wells.

Wesleyan Methodist College.—This college, which was opened on the 19th of August, is one of the finest buildings in Belfast. It is situated on a hill nearly opposite the Botanic Gardens. It comprises a longitudinal range of buildings, with two transverse wings projecting both front and rear, also a central rear building. The material used is red brick, with dressings of freestone, and in architectural design, general appearance, and internal arrangements, will compare favorably with similar public buildings. William Fogerty, Esq., of Dublin, was the architect; the builder, Mr. James Henry, of Belfast.

St. Mary's Episcopal Church.—This church, the first of five to be erected in Belfast in connexion with the Church Extension Association, was opened during the past year. It is situated in a commanding position on the Crumlin-road. The plan, as designed by the architects, Messrs. Slater and Carpenter, London, is cruciform, with a central tower, nave, north and south aisles, apsidal chancel, transepts, vestry, and south porch. The total length inside, from the west wall of nave to the east wall of the chancel, is about 110 ft.; width of nave, 24 ft.; total of nave and aisles, 56 ft. 6 in.; width of transept, 21 ft. 4 in.; and tower, 28 ft. square; height to wall plates of roof, 23 ft. 6 in.; to ridge of nave, 44 ft.; to ridge of aisles, 43 ft.; and to ridge of transepts and chancel, 40 ft. The height of the tower and spire is about 120 ft. The external walls are built of brick, faced with white Scrabo stone, having bands of red stone, and Scotch stone dressings. Mr. Jas. Henry was the builder.

St. Mary's Roman Catholic Church.—This building, situated in Chapel-lane, is an ornament to the locality. It is in the Romanesque style of architecture. The architect was John O'Neill, Esq.; the contractors, Messrs. John Connor and Sons. The church is 130 ft. in length, and 41 ft. in width. A tower 89 ft. high rises at one side of the front, and a large and tasteful brick window is in the centre. The altar, of Caen stone, richly inlaid with figured mosaic panels, was manufactured by Thomas Earp, Esq., of London, at a cost of upwards of £300. The floor of the church is commodiously seated; the passages being laid in encaustic tiles. The building has cost about £3,000, the altar and organ included.

St. Paul's Episcopal Church.—This church has been considerably enlarged during the past year, an additional wing having been added. The execution of the work was entrusted to Messrs. McLaughlin and Harvey. The wing is built in Gothic style, uniform with the church. The cost of the enlargement, which was borne by the Ecclesiastical Commissioners, amounted to nearly £1,700. The church is now capable of accommodating 700 persons.

The Mariners' Episcopal Church.—The foundation stone of this church was laid about six months ago by the lord bishop of the diocese. The church, which is far advanced towards completion, is situated at the corner of Great Patrick-street and Corporation-street. The extreme dimensions are 90 feet by 62 feet; it will seat about 600 persons. The walls are of Scrabo stone. The four main windows are of geometric design, executed in Glasgow stone. The tower, which is being built at the south-west angle, will be surmounted by an octagon spire of white limestone, with turrets, and will rise to a height of 130 feet. The ceiling, which is to be arched and groined with molded ribs, will spring from Sicilian marble columns, with

richly-carved capitals, to a height of 36 feet. The designs are by the architects to the Ecclesiastical Commissioners; the contractor is Mr. Walter Doolin, of this city. The cost will be about £6,000.

The new Public Slaughter-houses.—This much-required improvement has been completed, and the town is now in possession of public slaughter-houses, complete in every respect, at an expense of about £4,000. The site selected was May's Fields, situate at the east end of Macaulay-street, on the edge of the River Lagan, and near the Central Railway and Gas Works. The contractors were Messrs. Martin & Sons, Great Victoria-street, from the plans of W. Hastings, Esq., C.E. The new premises comprise three different sections of buildings, and include slaughter-house, cattle-sheds, and liquid manure tank. The slaughter-house is 240 feet in length, in ten compartments of 16 feet in width by 24 in length, which will be rented by the Council to the different butchers. The cattle-sheds are opposite to the slaughter-houses, and are divided from them by a passage of 20 feet in width, in the centre of which is a large sewer. The sheds are of the same number, length, and breadth as the slaughter-houses, but are built in double compartments, so as to suit the storage of different classes of animals. The liquid manure tank is divided from the cattle sheds also by a small passage. The tank for the purpose of collecting the blood of the animals slaughtered—to be afterwards used as liquid manure—is 8 feet deep. The manure yard is 16 feet wide by 150 feet in length, and the tank is 19 feet by 8 feet.

Extension of the Gas-works.—The Belfast Gas Company have very considerably enlarged their premises on the Ormeau-road, and in addition a new gasometer has been erected. It is what is known as a telescopic gasometer, and contains one million cubic feet of gas, and was erected by Messrs. Pigott & Sons, Birmingham, under the superintendence of James Steffox, Esq. The contractors for the stone work were Messrs. Monck & Co. The extension of the buildings was carried out under the direction of W. Hastings, Esq., architect.

The Plough Buildings.—The new premises of Messrs. Grattan and Co., druggists, in Corn Market, comprise a handsome range of buildings, on the site of the old Plough Hotel premises. There is a frontage of about 60 ft., of which Messrs. Grattan occupy 40 feet for the accommodation of their own business, and the remainder is occupied by Messrs. Gilbey and Co., wine merchants. The building is four storeys in height, measuring 62 ft. to the top of parapet. The pilasters to the shop front are of Newry granite, each being a single stone or monolith of 11 feet 8 in. The shop windows are a single pane each, of very large size, and are enclosed with Bunnett's patent shutters. The floor above the front is appropriated to offices. Over all there is an ornamental balustrade, and the words on the centre "Grattan and Co., 1828." Messrs. Thomas Jackson and Sons were the architects, and the builder Mr. W. B. McMaster.

Having taken a glance at the buildings completed in 1868, we must conclude by mentioning a few of those projected for the present year of grace. They are:—The Working Men's Institute, at the corner of Queen-street and Castle-street; the new Town-hall, opposite Police-square; the Central Railway Station in Victoria-street; new Episcopal Church in Millfield; new Presbyterian Church on the Crumlin-road; new Roman Catholic Chapel at Ardoyne; a castle is being built at the Deerpark, Cave Hill, for the Marquis of Donegal, from designs of Messrs. Lanyon, Lynn and Lanyon; the works of the Central Railway Company are being carried on with vigour; and the new floating dock has so far progressed towards completion that its opening may soon be looked for.

We may add that it is to be hoped that amongst the new buildings that will be started in 1869, will be the much needed Corporation Offices.

SPLITTING MASSES OF ROCK, &c.

THE breaking or separation of large masses of stone into smaller fragments may be said to include the various processes of blasting, the use of wedges and similar means commonly employed in mining operations, as in the coal regions of this country, the salt mines of Poland, and in marble, granite, and other quarries. These means are very often employed to subserve purposes of a similar nature, but of far less magnitude, in the removal of rocks and boulders from cultivated fields, highways, &c., or in reducing the size of such boulders to fit them for building uses or for the fabrication of stone fences and the like. Inasmuch as the employment of powder or other explosives, as in blasting, is always attended with some danger and frequently, in the cases last indicated, fails to accomplish its object, and the use of wedges is equally uncertain and far more laborious, a brief mention of more simple and at the same time equally efficacious means may be of interest to any who may have work of this character on their hands. One of the oldest and best-known means of splitting rocks in the direction of their strata is that which depends upon the expansion of thoroughly dried wood, when wetted or caused to absorb moisture. A crevice being formed or found in the mass at the point where it is desired to separate the same, has driven tightly therein a slightly wedge-shaped billet of seasoned wood, which when thus compressed between the walls of the crevice is wetted, and by expanding forces apart the strata on either side and effectually ruptures the rock. It is a matter worthy of a slight mention that while a piece of dry wood will thus expand by wetting, a dry hemp rope will be caused to contract in length by the same agency, a property which is sometimes taken advantage of in raising heavy weights for short distances. When it is required to separate the rock transversely to its lines of stratification, a much greater power is required, generally necessitating the application in some form of mechanical force. One method that has been used to advantage in some cases is to drill a vertical hole in the mass, fill it partially with water, and closely fit into the same, above the water, a steel mandrill. A heavy blow from a sledge or from the falling hammer of a pile-driver upon the mandrill causes the water to exert a sudden lateral pressure, which ruptures the rock. The great objection to this apparently simple plan is the nicety required in properly adjusting the mandrill in the bore, which of necessity requires more perfect tools and appliances than are commonly available where these boulders and masses of rock most do congregate, and where their removal is most to be desired. In speaking of the uses of water in this connection, we may instance a method of emptying it for the function under consideration, which has been found serviceable where the cold of winter is severe. The vertical bore in the rock is tightly closed, after being filled with water, with an iron plug, and the expansion of the water when converted into ice exerts a force which in some cases is almost resistless, and effectually secures the end proposed. Still another method, requiring perhaps less skill in its practical carrying out than either of the others just noticed, is that in which the hole or bore formed at a suitable point in the rock, as above described, has fitted into its lower portion an ingot of lead of corresponding shape and size in its transverse section. A mandrill of similar form and of hardened steel is then placed in the bore, with its upper end projecting out therefrom. The mandrill is then subjected to repeated blows from a hammer or sledge, each one of which increases the lateral expansion and consequent pressure of the lead; and inasmuch as the latter, from its peculiar inelastic nature, fails to resume its original position after each blow, it follows that the accumulated pressure at last becomes so great that the rock gives way and is separated into two or more pieces, which, if desired, may be again divided through the same agency.—*American Artizan.*

HIGH-PRESSURE WATER SUPPLY.*

THE important question of water supply at high pressure having of late years much engaged public attention, and the serious and frequent cases of failure in pipes, cocks, and taps, from the excessive strain of an inconstant force, whether caused by the fluctuating altitude of the head of water, the expansion of confined air within the pipes, or the still more subtle effects of frost, have led many to attempt to moderate these dreaded evils by means of reducing the pressure of the fluid passing through the conduits. And here it is important to observe that the chances of failure are increased during the hours of night, in consequence of the greater number of services in daily use being closed, the result being that the head of water in the mains becomes more elevated, causing the distress upon the pipes and cocks to be at the greatest possible; and so numerous are the obstacles to be encountered in the endeavour to provide against every difficulty, that any efforts which have been hitherto made public can only be considered as partially successful.

I have therefore ventured to lay before you this evening the result of my humble efforts to improve upon what has already been partially achieved by many learned investigators on the subject of high pressure water supply, believing that any useful appliance to save the enormous amount of damage to property caused by failure in the system, from whatever cause, might be regarded by the public as "a step in the right direction."

We have had so little experience in this country of the effects of pipes bursting from excessive head of water, that no calculation can be made as to the extent of damage to property, independent of the waste of water; any casualties that have occurred so far being confined to defects in street mains, which, although inconvenient, are beyond the reach of injury to our dwellings; and I am not aware of any effectual means of reducing the strain upon the large conduits conveying the water from the reservoir, the pressure upon which must be represented by the constant head of water maintained at the basin from which they are laid. Provision, by mechanical means, has been made to allow of the escape of confined air from the pipes, which has been found a dangerous element in the system of water supply; but, until some perfectly reliable self-acting valve has been found to permit the air to be let off without causing a waste of water, this subject will remain a cause of anxiety to the hydraulic engineer.

It was my intention, during the past session, to have brought before the Institute the very novel and ingenious invention of Dr. Kidd for relieving pipes from the effects of pressure or frost; but as this matter has been more ably laid before you by the inventor himself, the merits of each system will now become the subject of your valuable opinion, the pursuit of science being an open path, and its followers enlightened by honest rivalry. It must be evident that any means of water supply, to be at all times available, should be constant and self-acting; experience having proved that a system dependent upon personal attention will be open to neglect or abuse, the result being that confidence in its successful action becomes weakened, and that which was in itself good is cast into disuse for not being perfect, and therefore it occurred to me to endeavour to provide some means for ensuring a self-acting valve or inlet which would not be liable to any of the objections which have hitherto been raised against the means of saving existing pipes and fittings, and the result of my experiments it will be my privilege now to submit to this assembly, comprising so many eminent, scientific, and practical authorities.

In order to provide for a proper supply of water, under all the circumstances of household requirements, it is necessary that the

main inlet should be so arranged that it may fill the highest cistern of any building, not depending on the action of any mechanical means, requiring personal attention on the lowest storey or basement, as it frequently occurs that our kitchen, offices, &c., are situated on the upper floors, while little or no water may be used on the lower storeys, and therefore if at any time the upper cistern be left without water, the effect will be that the boilers become cracked when the cold water is admitted. The closets smell from want of daily flushing, and the baths are left without hot or cold water, when perhaps the most urgent demand occurs for their use.

To insure a full cistern at all times, the little mechanical contrivance now introduced to your notice has been designed, which will admit of a constant flow of water at high pressure, closing the main inlet when the cistern has been filled, and exhausting the rising main or supply pipe each time the full quantity has been admitted, leaving the pipes consequently free from the effects of frost when exposed in winter; a small pipe and cock being fitted to the exhaustor to admit of this provision being closed during the summer months, when no danger may be anticipated.

The opening and closing of the main inlet is effected as follows:—An inverted vessel or receiver is fixed in the top of the higher cistern, having a small air pipe from same attached to the warning or notice pipe, which is usually carried down to the position of the force pump in old houses. As the water rises in the cistern, the confined air in the receiver becomes condensed in proportion to the altitude of the water above the bottom surface, and is thus forced down into a chamber of the apparatus containing water at a fixed level; the extra pressure of air forces the water through a small opening at the bottom of the vessel into the adjoining vessel, causing the water in same to ascend, supporting the floating ball which forms a counterpoise to the weighted lever passing through the shank of the high pressure inlet cock. To prevent the evaporation of water from the vessel in which the ball is placed, a little sperm oil floated over its surface has been found a most perfect preventive, no perceptible loss of water or oil having been noticed after many months' trial, during which time the glass in which the experiment was made remained exposed to the air in a conservatory having a southern aspect. The withdrawal of the water from the cistern through any of the taps throughout the building diminishes the head of water and allows the descent of the ball, which again opens the cock—and this action is continued so long as the demand for water is made from the cistern by any of the services; and it will be at once apparent that, so long as the head of water remains undisturbed, the cock will not open; and as the notice pipe is only used as an air pipe, and the supply pipe left empty after each service, the pipes cannot be affected by frost, whether left inside or outside the house, care being taken that all the supply required for daily use should be drawn from the main cistern,—no other high-pressure service being allowed to be used. As the action of the lever must necessarily terminate the moment the discharge of water into the main cistern stops, to ensure an extra turn the plug cock has been designed to admit of a three-way motion, by means of a lever loaded with mercury, the effect of which causes the long end to fall suddenly when the ball is rising, receiving an impetus from the increased weight sufficient to give the plug a full turn for discharging the water left in the supply or rising main.

The fact that a vast quantity of water is wasted throughout the city, from want of due precaution, has induced the Waterworks Committee to impose heavy fines on all parties admitting of leakage from whatever cause; the constant escape of water from high-pressure cocks of even the most approved principle has already been the cause of serious complaint. Ample provision has been made for the present and increasing

wants of the population of this city; but no possible storage can be made for that quantity of water which may be lost through the numberless cocks or pipes continually wasting.

THE PURCHASE OF OUR RAILWAYS.

WE believe that there can be little doubt as to the final determination of the Government to buy up all our lines of railways. From the very satisfactory condition in which the matter now stands, and consequent on the recommendations put forward by the special commissioners, it is expected that Parliament will, at an early date, be asked to give its sanction to the immediate purchase of our Irish lines. In its last week's issue our contemporary the *English Mechanic*, whilst noticing the recent meeting held in the Mansion House, presided over by the Lord Mayor, has the following very apposite remarks on this subject:—

The case of the Irish lines is, to a certain extent, an exceptional one, and is one that could be readily taken in hand by a single board of directors. We are quite aware that many persons think the amalgamation of all the Irish railways under one board would be such a stupendous undertaking that it could not be accomplished; but comparing the railways of that country with England, all of them put together do not come up to a sixth-class English railway. The receipts of the London and North-Western Railway Company are some £6,752,000 a year; the Midland of England, £3,000,000; the Great Northern, £2,000,000; the Great Eastern, a little over £2,000,000. What are the receipts of the railways of Ireland? Something like £1,872,000 a year; so that while in Ireland the railways are managed by "ever so many" boards, in England the lines are managed by one board and staff with four times more than the receipts of all the Irish railways. The length also of the Irish lines bears no comparison with that of English railways.

The report of the committee goes far to prove that the purchase can be made without the likelihood of any loss; by the time that a profit has been arrived at, we may perhaps see our way to the buying up, as national property, of some other "systems." It seems almost settled that, in the hands of their present proprietary, no advance will be made in the Irish system. Were the cost of transit for certain articles reduced (such as coal), brickmaking, tiles, pottery, and cement making, would be developed—according to Mr. Mallet, C.E., and this lowering of tariffs would much affect the development of the Irish fisheries. Comparing railway fares in Belgium and Ireland, we have a rare contrast. A first-class fare from Brussels to Ostend—nearly 90 miles—is 4s. 10d.; second-class, 3s. 8d.; third-class, 2s. 4d. In Ireland the figures stand at 16s. 6d., 12s. 4d., and 7s. 6d. In Belgium the lines pay a net profit to Government of 7 per cent. True, for the first few years they were a heavy expense to the Government, and many prognostications of failure were uttered; but money was spent on them, and the profits soon came tumbling in thereafter. There the cost of goods transit is, we believe, about half that paid in Ireland; and how manufactures have sprung up along the Belgian lines we need not say. The cost of the construction of the Irish lines was about £27,000,000; had they to be made to-morrow their cost would not be over £20,000,000. The committee above noted have come to the conclusion that this latter sum would be sufficient to buy out the present proprietors—and quite sufficient, too, we think. By amalgamating the various lines a very large yearly amount would be saved in management costs. If the Government were to pay £20,000,000 for the Irish railways, the interest on that sum would amount to £634,500 a year. The net receipts from the railways in 1865 was £900,000. Deduct from that £634,000 for interest, and there would remain a profit to the Government of £266,000 a year. Then add to that the saving of, say, £100,000 in management costs, and it would leave a profit of £366,000 a year. This £366,000 of

* Paper descriptive of a "Self-acting Regulator for the Supply of Water at High Pressure," invented by Charles Geoghegan, Esq., Architect and C.E., read at meeting of Institute of Civil Engineers of Ireland, Dec. 9th, 1868.

a saving alone would enable them to give a reduction of a third in the fares to passengers, and to take off a fourth on the charge for the conveyance of heavy goods. With a reduction of the travelling charges, the certainty is that there would be a very great increase of goods; besides, a large increase in the number of passengers would follow. It is not contemplated that there should be such an immediate reduction of fares as would bring them down to one-half. The work should be a gradual one.

We have very little doubt that the result of these reductions would not be attended with any risk to the Government, but might go on increasing at such a rate as would enable folks to travel at rates about one-half what they are paying at present, and warrant them to forward merchandise at over one-half the present rates, when the resources of the country would be developed. Altogether the facts of the case are in favour of purchase by Government; and, as we have said, the case of Ireland being an exceptional one, and capable of "grasp" by a good head, the probabilities are that the bargain would benefit both parties, and that this benefit would go on increasing year by year.

L A W.

COURT OF QUEEN'S BENCH.

(Before the Lord Chief Justice and a Special Jury.)

The Queen at the Prosecution of Thomas Brazil, County Surveyor of Kildare, v. the Midland Great Western Railway Company of Ireland.—This was a proceeding by indictment against the directors of the Midland Great Western Railway Company, for the purpose of trying whether the Grand Jury of the County of Kildare, or defendants, were bound in law to keep in repair a certain bridge, called Pike Bridge, on defendants' line of railway, situated in the County of Kildare.

Mr. Dowse, Q.C., stated the case on behalf of plaintiff. He said—The Midland Great Western Railway Company were the inheritors, or heirs-at-law, or assignees of the Royal Canal Company, and as such they became entitled to the canal and everything connected therewith. The second count of the indictment averred that prior to the year 1795 there existed in the County of Kildare a highway running from Dunboyne to Naas, and at right angles to the turnpike road from Dublin to Mullingar, which passed the Duke of Leinster's gate at Carton. In the year 1795 the Royal Canal Company cut and dug a canal crossing the road, and it then became necessary to construct over it a bridge, with proper range and fencing walls, so as to maintain the communication. On the 20th July, 1813, the old Royal Canal Company was dissolved, and all its rights and interests were handed over to the Directors General of Inland Navigation, who subsequently transferred them to the new Royal Canal Company. In 1846 the Midland Great Western Railway Company became proprietors of the canal, and the prosecutor now alleged that all the obligations and duties that were cast upon the former owners became imposed upon defendants by reason of the purchase. They were now indicted for a breach of duty, and they met the indictment by a plea of "not guilty." The question as to whether they were guilty or not depended on some questions of law and some of fact. With respect to the latter he would be able to prove that the Canal Company, having made the bridge, made a parapet circular wall four feet high, as they were bound to do, so as to prevent the occurrence of accidents. The Duke of Leinster would tell them that when the circular wall got out of repair, and as he could not get the Canal Company to put it in order, he caused a protective paling to be erected after a valuable horse, belonging to Mr. Colthurst Vesey, fell over the bank and was killed.

Lord Chief Justice—How much would it cost to put this bridge into order?

Mr. Dowse—About a tithe of which it will cost for one day's trial.

Mr. Palles, Q.C.—There is a question of principle involved.

Mr. Dowse—Of course, railway companies are always looking for *principle* while their shareholders are seeking for *interest* (a laugh). The learned counsel went on to say the Duke of Leinster having remonstrated with the Canal Company on the unprotected state in which the bridge was left, they constructed "range" walls. His Grace complained of the way in which these range walls were built, as he said they ought to be flush with the road, in place of leaving a sort of trap for horses to fall into between the road and the "revetment" or retaining walls. The Duke of Leinster's evidence would be to the

effect, that he was now 77 years of age, and that he knew this "Pike Bridge" since the year 1798. Its condition in the year 1800 was fastened in his memory by the circumstance that while driving with his father from Celbridge, a highwayman named Tallon who infested the neighbourhood came in sight, and the horses of the chaise were whipped into a gallop over the bridge and on to Carton. At that time the walls were quite right and so was the parapet. The Canal Company subsequently built the range walls, in compliance with an Act of Parliament passed in the year 1796, to which their attention was called by the Duke of Leinster, as he had already stated. After thirty years these walls were now disgracefully out of repair, and the case for the prosecution was that, having made the bridge and walls for their own profit, the Canal Company and the defendants, as their representatives, were bound to keep them in repair. The county never repaired any portion of the bridge. In consequence of the railway running close by the canal, it became necessary to construct an accommodation bridge over it, and accordingly the Railway Company took down a considerable portion of the old bridge, and built a bridge with two arches—one, the old arch, for the canal, and the other for the railway.

Lord Chief Justice—Then the bridge now crosses both the canal and the railway?

Mr. Dowse replied in the affirmative, and said that as defendants admitted they were bound to repair the bridge, he could not understand why they should not repair the approaches to it. The case of the King v. Kerrison, reported in 3rd Maule and Selwyn, in his opinion settled the point, as the judges there held that parties making a bridge for their own profit were bound to keep in repair the accessories, or, as they were termed in former times, "excrecences." In the present case the parties at both sides were anxious to have the case brought to a settlement as soon as possible, and with that view they would now proceed to ascertain the facts, in order that, by a special case or otherwise, the matter might be brought before the court for final decision.

Lord Chief Justice—As far as I can learn from your statement, the case appears to me to be a very simple one, lying within a narrow compass.

Mr. Dowse—And it is so, my lord. I will prove, first, that the Canal Company built the bridge; secondly, that they built the parapet wall; and, thirdly, that when the Duke of Leinster remonstrated, they built range-walls without complaint, and we will prove that the bridge is now out of repair.

Mr. Palles—We admit it is out of repair, but we deny our liability.

Mr. Dowse—They say there are one hundred bridges in the same condition, and that is the excuse they give for not carrying out their obligations. The fact is, the county did not want the bridge at all, as the people in it would rather have the level. When the bridge was built, those for whose profit it was built were bound to keep it and the accessory works in repair, and that is our case.

Mr. Thomas Brazil, C.E., county surveyor, examined by Mr. Ryan, Q.C., deposed—That he was three years in office as county surveyor of Kildare county; he knew the Pike Bridge and the bridge passing over it close to the town of Maynooth; he had great experience in road-making, and he had no doubt that the original road, before the canal was made, ran on a level with the road adjoining; the approaches were raised to carry the bridge over the canal; witness had great skill in masonry as an engineer; he had examined the sides of the bridge and also the retaining walls; he believed the bridge was built before the retaining walls; the circular retaining wall was built to keep up the bank to the approach, and the bridge could not be used without it; the bridge appears to have been built in 1795, as it is shown on the medallion; the circular wall of the two wing walls, where the approach meets, are in a very bad state; witness's attention was drawn to it by His Grace the Duke of Leinster; he examined it particularly and found that any person driving over it on the north side, and whilst passing the railway bridge, if the horse took fright from a train passing, there would be nothing to prevent him from running over where the circular wall stood (witness here described it on the model); that place is not all protected; a wall originally stood there, and witness believed it to have been about three and a-half feet high, but it is now quite dilapidated; there is no protection except a temporary paling erected by the Duke of Leinster; there are gaps in the side walls that run from the bridge, and witness considered that all required renewal; witness saw the bridge two days ago, and noticed some repairs done to the actual bridge; observed, on examination of the bridge, that the original fabric had been altered to some extent; it was altered apparently when the railway was being made.

To the Chief Justice—It is necessary for the safe use and enjoyment of that bridge, that the circular and the parapet walls should be kept in proper repair.

Cross-examined by Mr. Carleton, Q.C.—The approaches are from twenty-one to twenty-four feet in width, which is the usual width; the roadway and approaches are not kept in repair by the county, nor has it been repaired by any contractor of the county; the bridge or approaches are not in his charge as county surveyor, nor are they in good repair at present; the roadway is repaired by a county contractor named Mullins, from the north side, and when he comes as far as the railway bridge he halts and goes no further; the road and approaches are extensively used by the inhabitants of the Co. Kildare; the range walls could not have been built on the revetment walls as they were badly built; it would be unsafe to build on them, and he has no doubt that that was the cause of the range walls being built inside; the fabric of the bridge is in good repair; it is 32 feet from the circular wall to the crown of the arch.

James Kelly, builder to the Duke of Leinster, examined by Mr. Gibson—He knew the Pike Bridge for over 40 years; he remembered when the range walls were built, which was about thirty years ago; he heard that the Duke of Leinster complained of the range walls being improperly built, as they should run straight over the revetment walls, which were very badly built; he saw the bridge on the 8th inst., and the circular wall is broken down to the earth; the top of the approach stands fully 18 feet over the level of the road, and makes a sudden rush down, which renders it very dangerous.

Cross-examined by Mr. Palles—He never saw any person repair the bridge since it was done by the railway company, when they re-metalled it; which was when they were making the railway 20 years ago; and when they took down the side walls to make them correspond.

The Duke of Leinster, examined by Mr. Ryan, Q.C.—Knew Pike Bridge for over 60 years, the circular retaining walls were then in existence, and the revetment walls as well; remembered when the range walls were built; could not remember when the revetment walls were built, but they were built before the range walls; believed he had a communication with the directors before the range walls were built; it would be very dangerous if a horse shied; when the range walls were built lamented they were not built on the revetment walls; could not speak as to dates so far back; it was by his direction the paling was put up, as it was in a very dangerous state at the time, and a horse had gone over and was killed. It is absolutely necessary for the safe enjoyment of the bridge to have the parapet on the circular wall preserved. Knows the bridge since 1801, and knows that the range walls were built by the company; could not say that he applied to the Board of Directors about the repairs of the range walls, but it is likely he did so.

Mr. John S. Mulvany, C.E., deposed—That from his skill and experience he believed the revetment walls and the bridge were built at the same time, as the character of the masonry and the material are the same, and appear to be the same age and structure.

Mr. Carleton, Q.C., addressed the jury for defendants. He said they were now sitting in a criminal court, and the prosecutor, coming in here in a criminal proceeding, was bound to make out his case to their satisfaction. It must not be matter of conjecture, of speculation, or of suspicion, but of certainty beyond all reasonable doubt. Now, it was an undoubted rule of common law that, *prima facie*, the county was liable to keep in repair all roads and bridges within its ambit, and if it did not do so it might be indicted and found guilty of breach of duty, unless it could show that some other party was liable. Although the bridge might originally have been built by a third party, the county was still, *prima facie*, bound to keep it in repair if it had derived substantial local benefit from it. That was founded upon the plainest principles of common sense and justice; for if a great public advantage was derived from the construction of a bridge, it would be monstrous to say that those who conferred that advantage should be held responsible for keeping the works in repair.

Lord Chief Justice—The evidence is that, before the construction of the canal, the road was a dead level. The people of Kildare did not require this canal.

Mr. Carleton—What I intend to say is that the county did require it.

Lord Chief Justice—But the highway was cut through, and the question is whether the persons who cut it through and made the canal, and who had to construct the bridge in consequence, are not bound to keep it in repair?

Mr. Carleton said that if the bridge was made solely and entirely for the benefit of the Canal Company they were bound to keep it in repair; but he contended that this bridge was not built for the benefit of the company merely, but for the benefit of the county of Kildare, among other counties. The canal was part of a great national scheme, originating with the legislature, for the improvement of the country. In the year 1715 an act (2nd Geo I., cap. 12) was passed to encourage the drainage and improvement of bog

lands, and the easing and despatching goods from one part of Ireland to another. The recitals in that act showed the condition of the inland counties at the time of its passing, and the legislature then put a scheme on foot, and held out lures to the public to engage in the promotion of inland navigation. By an act of the 8th Geo. I., cap. 6, sec. 6, commissioners were appointed for the purpose of carrying the former act into execution; and by the 3rd Geo. II., cap. 3, it was declared that, as it was reasonable and fit that works of such great advantage should be carried out out of some public fund, a fund should be raised for the purpose, and commissioners were appointed for each of the four provinces. These commissioners were constituted a corporation by the 26th Geo. II., cap. 10, by the style and title of the "Corporation for promoting and carrying on Inland Navigation in Ireland." This corporation was dissolved by the 27th Geo. III., cap. 30; and by the 29th Geo. III., cap. 33, it was provided that debentures to the amount of £66,000, bearing interest, should be issued to such persons as might be undertakers for completing the navigable canal from the City of Dublin to Tarmunbarry, on the River Shannon. The issue of these debentures had the effect of bringing people forward as undertakers, and they were incorporated as the "Royal Canal Company," under the act 38, Geo. III., cap. 20. By this Act they were bound to carry out the line of the canal by which to promote the local advantages which were contemplated by the legislature, and all of which were derived by the County of Kildare, and yet the latter now turned round and said the company was nothing but a body of promoters and undertakers, and was bound to keep it in repair. He now came to Act of Parliament, 36 Geo. III., cap. 57, sec. 8, passed 1796, under which it was sought to make defendants liable. It should be borne in mind that the bridge was made before the passing of this Act, which cast a new burthen on the company, never thought of by the legislature when they were alluring the people to carry out their designs.

Lord Chief Justice—I do not agree with you, Mr. Carleton, that there was no liability cast upon them before that. I think they were bound to give the people as convenient and safe a passage as they had previous to the cutting of the canal. What do you say is the effect of the Act which you have cited?

Mr. Carleton—To compel the company to build these walls, but there is nothing in it to compel them to keep them in repair. Wherever, throughout these Acts of Parliament, it was intended to impose a responsibility, it is distinctly specified.

Lord Chief Justice—I quite see that great inconvenience has arisen from the parties not making proper parapets, fences, and range-walls; and I think there is a clear duty cast upon the company.

Mr. Carleton—Yes; to build them.

Lord Chief Justice—If it will save time I will, for the purposes of this trial, rule, that there is attached the duty to keep the works in repair. Otherwise, it might happen that the day after the bridge was built, it would fall, and great danger and inconvenience would ensue.

Mr. Carleton—By the 58 Geo. III., cap. 101, the Royal Canal Company, by reason of certain neglect, was dissolved in the year 1813, and its property vested in commissioners for the benefit of the public. These commissioners continued in its management for five years, during which time no application was made to them to put the works in repair. From the date of the new Royal Canal Company in 1814, under the Act 58 Geo. III., cap. 85, up to the present proceeding, and for a term of fifty years, no complaint had been made of the works not being kept in good order by the proprietors of the canal, nor did the executive take any action in the matter, although quarterly returns of works done or required to be done were regularly furnished in compliance with the Act of Parliament.

Mr. Ryan observed that the returns referred to were more in respect to the canal itself and the maintenance of the navigation than anything else.

Mr. Carleton—If the legislature thought it necessary that the works you now contend for should be done by the company, they would have specified it in the Act.

The Lord Chief Justice expressed his opinion that the works referred to were for the maintenance of the navigation, and that quarterly returns should be made of them, and that they had no reference to works intended to secure the safety of the public.

Mr. Carleton said he would merely observe that he would give evidence that for a period of forty years the Canal Company had never repaired the approaches, except when they were re-metalled after the construction of the new bridge over the railway.

Mr. Pallets said that as the case must necessarily resolve itself into a question of law, he would ask the learned judge to take down on his note the admission of counsel for the prosecution that the fabric of the bridge was in good repair. For defendants he admitted that the approaches were not in repair. The

whole question was—Were the defendants liable? The course taken in a similar case in England was to take a verdict of guilty, with liberty to defendants to enter a verdict for them, if the court should be of opinion that they were not responsible.

The Lord Chief Justice acquiesced in this view.

Mr. Wilson Kenny, a bank-ranger in the employment of the defendants, and Mr. Hugh O'Neill, who formerly acted as superintendent of works, gave evidence to the effect that since the year 1830, and for some years previously no works of repair had been executed at the bridge, except on the completion of the railway arch.

Mr. James Price, engineer to the Midland Great Western Railway Company, deposed that since he took charge of the line, six years ago, no repairs had been executed.

The Lord Chief Justice, addressing the jury, said—Gentlemen, in my opinion the safe course to adopt here for the purpose of having this matter fully argued, is to have found a verdict of guilty, with leave to the defendants to move to have a verdict entered for them if the Court should be of opinion that they are not bound to make these repairs. In the view I take of it—that as in the inception of the matter the bridge itself was built by the Canal Company, the obligation to repair it, which is admitted by the defendants arose, there was also necessarily connected with that obligation the duty of repairing the approaches, on the ground that it is all one structure. It may be that the Acts of Parliament cited by Mr. Carleton may contain something in his favor, but my opinion is that the Act of the 36th Geo. III. casts the responsibility and liability for making these repairs upon the defendants rather than on the county. However, between two such important bodies—the county and the railway company—supplied as they are with such able counsel, the matter will be fully argued, and the evidence I have taken thoroughly scrutinized; and if Mr. Carleton's view shall then prove to be the correct one, the defendants shall have the benefit of it.

A verdict of "guilty" was then returned, and the proceedings terminated.

VICE-CHANCELLOR'S COURT.

THE PROVINCIAL BANK CASE.

Thomas Hewat, public officer of the Provincial Bank, and Mrs. Murray, Administratrix of Mr. Robert Murray, deceased, v. John Nolan and Wm. G. Murray.

—Mr. Rogers, Q.C., moved on behalf of plaintiffs in the bill for an injunction restraining the defendant, Mr. John Nolan, from proceeding with the actions against them at common law which had been commenced by him in the Court of Queen's Bench. Counsel opened the several matters charged in the bill at considerable length. The Provincial Bank of Ireland having, prior to the 23rd of February, 1863, purchased certain premises in College-street and Fleet-street, the directors caused to be prepared by the defendant, Mr. W. G. Murray, the architect, a specification for taking down and removing the buildings then standing, and for making and completing a bank; and, having advertised for tenders for the erection of the buildings, Mr. John Nolan tendered for the same, and his tender to execute the works for the sum of £20,350 was accepted by the directors. For the purposes of the contract, it was agreed that Mr. W. G. Murray should be the architect of the bank, until the bank (by writing under the hand of their chairman or secretary, delivered to Mr. Nolan, or left for him at his place of business, or at the works), should appoint another architect in his place. It was also alleged that no extra works should be allowed whatsoever, unless ordered as such in writing by the said architect, previous to their execution. The architect was to be at liberty to make such alterations in addition to, or deductions from, the buildings or works as might be found expedient, either before the commencement or during the progress of same; but such alterations, additions, or deductions should not vitiate or annul the contract; the value of the same to be ascertained by the architect, and either added to or deducted from the amount of the contract, as the case might be, or the circumstances require, and to be regulated by the rates contained in the schedule of prices. The bank has already paid, in respect of the buildings, on the certificates of Mr. W. G. Murray, sums amounting to £26,800, and of this sum £7,200 was paid on account of extra works. It was charged that in respect of such extra works, and the charges made for them, there had been an entire deviation from the terms of the contract. On the 23rd May, 1868, Mr. Hewat received from Mr. Nolan a letter requesting him to place to his credit the amount of two certificates signed by Mr. W. G. Murray, one in respect of extra works connected with the foundations, amounting to £6,289 4s. 4d., and the other on account of general extras, amounting to £1,538 3s. 8d., making together the sum of £7,927 8s.,

which Mr. Nolan required to be paid in addition to the sum of £26,800—making in all £34,627 8s. On or about the 15th day of June, 1868, Mr. W. G. Murray, after he had ceased to be the architect of the bank, and another architect had been appointed by the bank, gave to Mr. Nolan another certificate, dated the 15th of June, 1868, for £750, which sum, being added to the £34,627 8s., made an aggregate of £35,377 8s. The plaintiff further charged that in respect of the extra works alleged to have been executed by Mr. Nolan, and particularly in so far as relates to the foundation works, and the ascertainment of the cost of all such works, the conduct of Mr. W. G. Murray, in allowing the same, and signing the certificates before mentioned, and of Mr. Nolan, in requiring payment of the sums claimed by him as aforesaid was grossly improper, unfair, and fraudulent; and therefore the bank ought not to be held to be bound by such certificates, or any or either of them, and the same, it was submitted, ought to be declared fraudulent and void, and not binding on the bank. Counsel contended that, upon authorities which he quoted, his lordship should grant the injunction sought, restraining the defendant from proceeding with his actions at common law.

Mr. Pallets said he appeared on the part of Mr. Nolan to resist this motion for an injunction, and he hoped to satisfy his lordship that it would be against all precedent to grant it, and that no case was made by the bill within the authorities to justify the court in entertaining this question at all. Mr. Rogers had only stated one-half of the case; he had merely opened the affidavit of Mr. Hewat, who admittedly knew nothing of the mode of measurement and of the mode in which accounts were taken. The facts must show how he obtained his knowledge. The plaintiff had not complied with the rules of the court, for he had not given him a particle of evidence upon which he could act. What was it his learned friends asked his lordship to do?—they were not at present hearing the case—but they were asking his lordship to set aside two actions, each of which actions was brought to recover the amount included in the two certificates. No action had yet been brought for the £750, for under the contract that money would not be payable for six months from the date of the certificate. It was sufficient for him to say that no question arose as to the £750. The question was, were his client's two actions to be allowed to go on—those actions being confined to the amount of the two certificates? He would ask his lordship's attention to the grounds on which it was sought in this court to restrain Mr. Nolan from proceeding with his actions. The bill did not allege, or pretend to allege, that there was not a defence at law. They were now in Nov., 1868, and the first action they had thought proper to move to stay was brought on the 9th of June last. On the 23rd of June the plaintiff (in the bill) pleaded to that action, and let them now see the meritorious case put forward by the defence which might be a good one in a court of law. A demurrer was taken to it, and if it were a good defence, he was prepared to meet his learned friends and try it with them. He was not afraid of trying the issues knit by their defence. His client's action was brought against Mrs. Murray, the personal representative of Mr. Murray, the public officer of the bank, who entered into the contract upon which he (Mr. Nolan) sued. Mr. Nolan was told he could not bring his action against Mrs. Murray; he must proceed against the public officer of the bank. This, however, was not so. Where a contract was entered into, a contract under seal, although the party described himself as the agent, still if he contracted personally, as Mr. Murray did in this case, the action at law would lie, and only lie, against the agent himself. It was sought, under the act of Geo. IV., to have raised a very ingenious argument on this point—namely, that it was only against the public officer in contracts of this kind that an action would lie. He denied altogether that proposition. Counsel then proceeded at length to open the affidavits of Mr. Nolan and others, in which it was positively sworn that there was only a fair and proper charge made for the extra work. Mr. Nolan, in the most emphatic manner, denied that his charges were extravagant, and repudiated the statement that there was any fraud or collusion between himself and Mr. Murray, the architect. Counsel went on to say that if they had charged fraud in their defence to the action at law they would have gone to trial with them at once. In the month of June last £5,000 was offered to his client if he would give up these certificates, but he would not do so. Counsel argued that this injunction could not be issued, because no case was made by the bill.

The case having occupied the court for the greater portion of a day, it was ultimately arranged between the parties that the actions at law should be stayed, upon the terms of the plaintiff (Hewat) paying to the defendant, John Nolan, £4,000 on account, without prejudice to the defendant's rights to proceed in the suit to establish his rights to the balance claimed by him.

COURT OF COMMON PLEAS.

Rielly v. Whitworth.—This was an action brought by Mr. John Rielly, a contractor and builder, residing in Drogheda, against Mr. Benjamin Whitworth, M.P., and his brothers, William, Robert, and Alfred Whitworth, trading at Greenhills, Drogheda, as Whitworth Brothers, to recover a sum of £162 8s. 10½d. for goods sold, and work and labour, &c. Defendants lodged in court a sum of £50 8s. 8d. as sufficient to satisfy any claim of plaintiff. It appeared that defendants, being anxious to have a number of cottages erected near Drogheda for the accommodation of the persons in their employment, agreed with plaintiff to build same. Some of them were to be built for £69 5s. each, and some for £60. Plaintiff built some houses, for which he was paid, but his complaint was that after he had prepared a number of window-sashes and frames, and other articles of a like nature, defendants directed him to stop building, and those articles were left on his hands. Defendants' case was that plaintiff, after he had built some of the houses for £69 5s., complained that he was losing by the contract, and he was allowed to break it off; that subsequently he was employed to build five or six other houses of the same description, for which defendants paid him £5 each more than the sum originally stipulated for, and that the frames and sashes were suitable for the houses to be built for the £60, none of which had been commenced by him, and that he never was in any way prevented by defendants from performing his agreement, but that it was at his own request the contract was rescinded. Verdict for plaintiff, £112 over and above sum lodged in court, with costs.

CLOCK AND BELL TOWER FOR PROPOSED NEW MARKETS.

OUR lithographed illustration, accompanying this number, is of the clock and bell tower to be erected in connection with a proposed new market in Green-street, on the site of Newgate prison. Edward H. Carson, Esq., F.R.I.A.I., is the architect.

GAS.

AT the weekly meeting of the Board of Guardians of the North Dublin Union on Wednesday last, a discussion arose regarding the tender of Messrs. Edmundson and Co., of Capel-street, offering to supply the house with 17-candle gas at 4s. 3d. per 1,000 cubic feet, being 3d. less than that charged by the present contractors, the Alliance Gas Company, for 16-candle gas. The majority of the guardians were in favour of accepting Messrs. Edmundson's tender, and two notices of motion were given, to the effect that the Alliance Gas Company should be informed of the intention of the board to enter into a contract with another company for the supply of gas, and also that Messrs. Edmundson's tender be considered on that day fortnight.

CORRESPONDENCE.

[It is to be distinctly understood that although we give place to letters of correspondents, we do not subscribe editorially to the opinions or statements set forth in same.]

TO THE EDITOR OF THE IRISH BUILDER.

SIR,—In the town of Belfast there is just now, and has been for some time, a great discussion going on with reference to a peal of bells. It appears that this large town is without such a desideratum. In Dublin we are somewhat better off. Amongst those who have taken a part in the discussion is Mr. W. Spackman. In a letter which has appeared in the *Northern Whig*, he says:—

SIR,—So much having been written upon the subject of a "Peal of Bells" for Belfast, it may seem superfluous to say more; but, as persons in this locality have had little opportunity of knowing much about church bells or their uses, the subject for all practical purposes is untouched. A meeting was called by advertisement in the Chamber of Commerce some days ago, with a view to provide a peal for "the town;" but this design appears to have been changed, and the object of the meeting converted into

one for providing a peal for "one of the churches;" as no report was given, no additional light emanated therefrom. Having in early life become acquainted with the subject of bells and "bell-ringing," from living in a locality where there are many good peals, and much emulation among scientific ringers, I may be excused for thus adding to the "correspondence." By accident, I recently heard that designs are in preparation and soon to be submitted to the "Council" for selection, and as there is no place in Belfast where a peal of bells, worthy of the name, could be erected, this opportunity in connexion with a town hall affords the best solution of the question, as a peal thus placed would be the property of the town, and not under the control of any sect or party; whereas, if a peal was placed in a church, they at once become the property of the incumbent for the time being, who, it is possible, might disagree with the public as to when they should be used, and instead of being a source of joy, they might become a means of strife. I should be glad to see our Episcopalian friends providing their churches with bells, but towers must be provided first—at present there is not a church in town where such can be done. St. Mary's (Crumlin-road) has doubtless been built with a view to the reception of bells, but the architect appears to me to have failed in his object; there is plenty of room to hang a "peal of eight," having a clear space of 22 ft. by 20 ft., but it may be doubtful if the walls are strong enough, being built mainly of brick, and only 2 ft. 6 in. thick, whereas old towers of much smaller dimensions have solid stone walls, about 4 ft. thick. But another, and it may be greater difficulty arises—the tower from the floor of what must be the "belfry," is not apparently half high enough, so that without some great alteration, there is an end to this as a receptacle of bells, excepting as a "chime," to be played upon by machinery like a barrel organ, which, as an ultimatum, is only a burlesque as to the use of church bells. Then the distance from the centre of the town—as far as the inhabitants generally are concerned—is another objection; but were I an Episcopalian, I would endeavour to have a peal connected with this beautiful church, if practicable. I may again recur to this subject, and give your readers some information as to the weight, size, cost, &c., of various celebrated peals, as also some indications of the method of scientific ringing; and although I have no doubt the tolling of the fine bell recently erected at St. Malachy's has stirred up this "bell business," I hope more than one or two good peals may be the result, and that many of our intelligent artisans might be inclined to study the science of ringing, which would afford much healthy bodily exercise, as well as intellectual enjoyment.

Columns upon columns of newspaper correspondence have appeared upon the subject, and it is amusing to observe the various crude suggestions, embryotic and know-nothing ideas started on the subject. It seems as though the discussion of the project had been called up by the fact that Bishop Dorrian has recently erected a belfry to St. Malachy's Catholic Chapel, in which he has placed a fine toned bell that can be heard for miles around Belfast. If this lead to a peal or peals of bells being established in this most melancholy town, it will be the harbinger of better days to the townsfolk. It is ludicrous to witness the nervous anxiety that is manifested amongst the several churches to show cause why the peal should be hung in their tower. How excessively mean this is! Let those churches, of whatever creed, who feel the great desirability of such a thing, provide peals for themselves. This would certainly be not only a very praiseworthy effort in connection with any church, but would also afford means for making use of those expensive structures in towers and spires which are at present mute and vacant; and like so many skulls, more or less brainless, unmeaning, and useless. No! generally speaking, one man's empty skull ought not to expect to be filled with the brains of another; they must be supplied and developed by himself. Most happy will it prove for the community—and I may add, sir, for the interests of the noble science of architecture—when no towers are built to churches without this view, merely to stand as dummies and shams; and by the frequent iteration of such useless structures, to disgust the people. It is a matter of congratulation that this movement in Belfast has taken a municipal direction; and it is to be hoped that the promoters will not allow the scheme to be degraded by sectarian mendicancy, but carry out the noble project in a noble style, for the benefit of the town, without regard to creed.

BELL-PULL.

MISCELLANEOUS.

THE ARCHITECTURAL REMAINS OF INDIA.—It is satisfactory to hear that the proposal of Government to preserve records of the architectural remains in India is in course of being carried out. The *Bombay Builder* reports the proceedings at a meeting, held on the 3rd of November, to decide on a suitable object for the first efforts of the moulding, drawing, and painting party, which have been under training for this purpose for about six months. Dr. Wilson suggested Mount Aboo, and the ruins and remains in its neighbourhood, as possessing much artistic and antiquarian interest; Mr. Burgess, who exhibited a beautiful set of photographs recently taken at Palitana by Messrs. Sykes & Dwyer, was of opinion that this strange and wonderful city of temples should be first explored and copied. Dr. Blau Dajee offered some interesting and valuable suggestions. But, in consideration of the difficulty of getting to these places, it was finally agreed that the first attempt, which will necessarily be of an experimental nature, should be made at the temple of Ambernath, near Callian. In process of time, as the staff gets to be thoroughly organized, it will be sent further afield, and the remains suggested at the meeting will be taken in hand.—*Builder*.

GAS MADE BY THE AIR-PUMP.—Atmospheric air charged with vapour from petroleum refuse, a kind of "gas" not unknown in this country, but now tried in America, and, of course, claimed as an American discovery, has been brought into use in Canada. An air-pump sends a stream of air through a cask of petroleum or paraffine refuse, and the "gas" thus made goes at once to a gasometer and fills it ready for use. The gas is said to be so pure and inodorous that it gives no warning of leakage, and it burns brilliantly. Private dwellings are provided with the apparatus, and make their own gas, as, perhaps, they draw their own water, by a little pumping!—*Builder*.

A NEW YORK SHOP.—Stewart's retail dry goods store, Broadway, New York, claims to be the largest in the world; it covers two acres. The building is six storeys high, and has a basement and sub-cellar below ground; the steam boilers to raise the elevators are under the sidewalk. The basement is used for the sale of oil-cloths. The first storey is the saleroom for nearly every kind of dry and fancy goods, except carpets, cloaks, shawls, and millinery. From the centre of this storey rises, to the height of 100 feet, the great dome, topped by a flat skylight. It leaves a space 60 feet in length in the middle of the remaining floors. Each of the higher floors is devoted to its own class of goods, and every floor has its washing-rooms and saloons for the use of the customers. All the gas jets are lighted simultaneously by an electric battery, producing a most brilliant effect. The entire interior is white, the monotony being amply relieved by the brilliant colours of the goods; the ceilings are all to be frescoed. The view of each entire floor will be obstructed only by the numerous columns, which are of iron, and are adorned upon each of the four faces with alto-relievos of Cupids, and with vases of flowers. Six hundred clerks, male and female, are employed in the various sales departments, and 600 women are occupied in the preparation of clothing. The house contains a population equal to that of a small town.

It is worth record that the Lifeboat Institution has 189 lifeboat stations around the coasts of the United Kingdom,—that in eleven months of the present year 697 lives have been saved by their means, raising the grand total to 17,684,—and that the Turkish Government have ordered four lifeboats from a builder at Limehouse.

According to a recently-published Parliamentary paper, there are in England and Wales 904 telegraph stations used by railways and the public, and 717 stations used only by the railways; the total length of wire under their control being 11,635 miles. In Scotland, there are 270 telegraph stations, with 2,896 miles of wire open to the public and the railways; and Ireland has 63 stations, of which 21 are for the railways exclusively. Besides these, there are 2,155 stations belonging to the several telegraph companies, with nearly 80,000 miles of wire and 4,688 of under-sea telegraph cable.

The Queen is about to clothe Mr. Digby Wyatt with the honors of knighthood—an act which will tend to the credit of that ancient and noble order, of late years very unworthily depressed in public opinion.

All Communications respecting the IRISH BUILDER, should be addressed to MR. PETER ROE, 42, Mabbot-street, to whom all payments for Subscriptions and Advertisements must be made.

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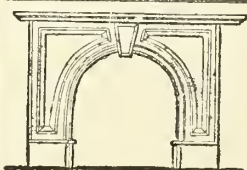
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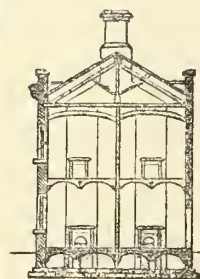
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The Irish Builder.

VOL. XI.—No. 218.

Domestic Architecture.



ESPIE all that has been written on this subject, and in face of the innumerable drawings, disquisitions, and specifications that are extant, the houses usually built for the middle and lower classes are disgraceful and deplorable. It has ingeniously been pointed out, how man is superior to the brute creation if we only look to this one point—namely, that while birds and beasts construct their nests precisely in the same manner now as they did at the creation, man goes on improving from year to year in this matter; and thus by the progress made, gives evidence of his superiority, and of his reason.

Most unmistakably does the truth meet us on every hand, that the principles of mechanical construction and physical science are in a state of development that bears a marvellous comparison with the crude appliances existing in past times. The science of house-building, however, has not by any means kept pace with that of construction in other departments of industry. And it is a lamentable reflection, that by far the greater majority of those who, by hand or brain, contribute to the comforts that are to be enjoyed in this age of railways and steamboats, dwell in houses where life is either a constant war with bad drainage, bad ventilation, with ignorant and insolent landlords; or where they subside into a quiet resignation to these and the like evils, with a moral certainty of meeting death long before, in the natural course of events, might otherwise be expected.

Whilst owners and occupiers of large houses can afford to attend to matters of such vital, such life and death moment as efficient drainage, ventilation, &c.,—the artisan class are left to the mercies of ignorant and rapacious landlords; who, building houses wholly and solely with a view to pecuniary return, employ raw, incompetent, or dishonest persons to “jerry” up tenements, which, when occupied, soon afford proof of their bad construction by the complaints and the misery of the tenants; and the constantly worried landlord soon finds out he has been cheated, or is cheating; and finds in either cause a reason for doing nothing at all but in bullying his victims out of their money.

The other day a remark was made—“The more it is shown how to build houses right, the more they will build them wrong.” It is not to be expected that men can be got to turn from the evil of their doings all at once. Nor is it to be expected that a few strictures now and then on this fruitful topic (fruitful, we mean, because ill weeds grow apace) will do much to counteract the dreadful evil of which we are speaking. Our contemporary, the *London Builder*, has dwelt upon this subject with little intermission. It has entered into the dark holes and corners of London, and brought to light phases of evil connected with home arrangement and con-

struction, which ought to astonish us in this age—which, considering these plague spots, we ought to be ashamed to boast of as—an age of advanced civilization. And if we were to go into the courts, alleys, and byeways of Dublin, Belfast, and Cork, we should find specimens that would open the eyes of the town authorities; or at any rate if brought to notice as they ought to be, would tend to turn corporations from the evil of their political ways, and attend to the health of the towns and districts over which they exercise jurisdiction.

The builders of the ill-arranged and ill-constructed houses of which we speak, although they build alone for gain, start on a wrong principle. It would, we doubt not, be easy to show how the landlord of the “jerry” house loses in the long run far more than the owner of the well-built house property, even if the latter has cost a little more in original outlay. The “jerry” builder begins by raking together the cheapest materials that he can lay his hands on, irrespective whether or not they are fit for building, if only when the house is finished, or rather if, when ready for occupation, it can be made to look genuine. In building, at every stage, the manoeuvre is to avoid doing any work that can be avoided, but which lack may be made to look as though the proper work was done. These sort of houses, however, have their disadvantages; to the landlord they are always changing tenants; and the loss of rental soon counterbalances what would have been necessary to build them on a good basis. Almost as soon as the tenant enters, something is discovered that has been neglected. Following close is another and another discovery, and soon both landlord and tenant become disgusted. These sort of houses are in fact never finished. Improper materials and bad workmanship, have managed to knock together what from the very first is beginning to decay and tumble to pieces; and the thing is soon past praying for, and could only be put right by razing it to the foundation and beginning afresh.

The proper way to build for every class of society is, by considering the wants and the health of the inmates of the domicile. If that is the basis on which the building is started, the house will be good; not only so, but it cannot fail to secure an ample return for the outlay. It should not be forgotten that the chief elements of life and health are open to all without cost; and being so, houses constructed on these broad principles ought not to be more costly than houses ignoring these principles. We shall resume this important subject. It has yet to be shown why men should be allowed to build houses where people are provided with bad air, bad water, bad smells, &c., &c., any more than why quack doctors should be allowed to poison and murder people.

ON INTERNAL DECORATION.

“Da propriam, Thymbræe, domum.”—ÆNEID.

THE two English words, “Decoration” and “Decency,” spring from a common root, but, like many other English words, their ordinary acceptation at present differs somewhat from their original meaning. This common root is the Latin verb *Decet*, it is convenient, becoming, appropriate. “Decoration” would therefore mean the imparting, “Decency” the possession of, these properties. The former word, however, is now for the most part limited to the addition of matters of

ornament, real or supposed, without much reference to their utility or taste.

As applied to the interior of dwelling-houses, “decoration” is commonly used to signify extra ornamentation by way of gilding, picking out, &c., to painting and paper-hangings of a more or less showy and costly character. Thus we frequently see over shop doors such announcements as—“James Whitelead, House-painter, Paper-hanger and Decorator,” said Mr. Whitelead being very slightly conversant with the laws of colour. But this is obviously a very restricted and improper application of the word, because, if the internal decoration of a house implies its equipment with objects convenient, becoming, and appropriate, it must evidently include furniture. We will even go further and say, that the furniture of a room, if judiciously selected, forms the key to its decoration.

The furniture of a room may, in general, be safely taken as more costly and valuable, than its mere painting and paper ornamentation, and may therefore be considered as occupying in it, the same place as the principal figures do, in a picture. But the principal figures in a picture should be its dominant ones, to which all its other parts should be subordinate and contributive. We must not, in our more advanced years, forget the maxims of our old Friend and Schoolfellow, however little we may have prized them in our youth—

“Humano capiti cervicem pictor equinam,
Jungere si velit,” &c., &c.—DE ART. POET.

If the decoration of the walls of a room be executed without reference to its furniture, simplicity and unity of design will in all probability be sacrificed, and those incongruous results produced, that are so graphically described in the lines above indicated. Thus, the prevailing colour of the walls may be in deadly discord with that of the carpet, and the hangings, &c., with both.

But we have laid down the condition, that the furniture itself be judiciously selected, and this is a fundamental condition, without which no amount of colouring, however tasteful and correct in itself, will suffice to produce an agreeable, much less an ornamental, effect. Situation, aspect, architectural style, uses, and other such circumstances, will determine the choice and style of the furniture; and the tone and style of the wall decorations being kept in subordination to, and harmony with, these, that pleasing, inwardly perceptible, but not easily definable, effect, called, when applied to the higher art, “repose,” will be produced. This is “decoration.”

These cursory observations have been suggested by the perusal of an original and instructive paper, in your last issue, on “Imitation in Architecture,” by Mr. J. H. Owen, M.A., &c., as there is scarcely any branch of the architectural profession in which bad imitation, or “sham,” is so much practised, as in internal decoration. We frequently see introduced into designs of furniture and other decorations, representations of objects belonging, sometimes to the realms of fancy, often to the animal and vegetable kingdoms. As to the first, *de gustibus non disputandum*; in regard to the second, we do not belong, in any capacity, to the Society for the Prevention of Cruelty to Animals, and therefore shall offer no remarks on the propriety of making some delicate-looking, but unfortunate Caryatid appear to sustain on her head, a load sufficient for a Titan, when she might, without any sham or imitation, be ornamentally employed, standing before, and screening the real

but less fanciful support. It is a mortal sin against Taste to make "decoration" even appear to do duty for "construction."

But in the imitation of objects taken from the vegetable kingdom, there is often displayed a lamentable disregard for either truthfulness or sentiment, and even a palpable ignorance of the physical properties of the material employed. In respect of truthfulness, for instance, we sometimes see a curtain-pole germinating, at either extremity, into a bud or flower of tropical luxuriance and dimensions; at other times, we may observe bunches of fruits, flowers, and leaves stuck together, in such a manner as Nature never produced, from her earliest apprenticeship.

Some woods are, by their natural qualities of grain, &c., better fitted for one style of carving,—say the Gothic, in which the details are generally small, angular, and in low relief; while other woods are more suited to those designs in which the style is broad, and the details soft and smooth. Some of the woods often used in the best furniture, are badly suited for carving in any style, their colour and grain, particularly when polished, seriously marring the effects of light and shade, the chief sources of effect in ornamental carving.

On a future occasion we shall offer a few observations on some of the principal woods used in cabinet-making. F. L.

THE CIVIL SERVICE ON ITS TRIAL.

THE Civil Service is again upon its trial. It is now definitively understood that one of the first acts of the present Administration will be to reform the Civil Service, so, at least, the official mandate is worded. We have no precise knowledge of the steps that will be taken to ensure this measure of reform, but we may be pretty certain it will be economical in all its arrangements, but whether there will be any increase in its usefulness must remain to be seen. Mr. Gladstone's Government is pledged to retrenchment; the estimates necessarily then will be the first to suffer, because in them the scope for economy is wide, but even in this instance there may be false economy as experience more than once has disastrously proved when the cheese-paring mania has been in the ascendant. It seems a doubtful line of policy to attack the estimates whenever a saving is required, yet it is always found to bolster up the revenue. "When in doubt, play trumps," is the maxim of a whist-player, and it would almost appear that the first words of a Finance Minister, budding into manhood, are "To show a surplus, reduce the estimates."

It has repeatedly been pointed out in these columns that with proper and judicious treatment many thousands might be saved annually to the revenue by abolishing sinecure offices, for the country can derive little or no benefit from the continuance of these appointments, but it may become a serious mistake to use the pruning-knife too freely, and endanger the efficient performance of the public service. It would, we apprehend, be difficult to find many impartial men willing to endorse the opinions of Mr. Bright that the Services are "corrupt and privileged," for a generous recognition of those men who have devoted their best energies to the service of their country has always been a marked characteristic of the intelligent classes in England. The day has long gone by when it was the fashion to decry the Civil Service, and to fancy that its members were a pleasant though expensive incubus upon the public at large, and, happily, there is no probability of this idea again taking root with those who know better. Nothing is more remarkable in the constitution of the Civil Service than the manner of its growth; it has sprung up gradually and grown until it has become a source from which large revenues may be drawn by the Government

either at the sacrifice of benefit to the country or the comfort of the clerks themselves. Very properly has it been said that the Chancellor of the Exchequer has no right to glory in a surplus at the expense of the civil servants of the Crown. As "every labourer is worthy of his hire," so surely may those who give laborious service in return for a small pittance think they are justly entitled to consideration at the hands of those entrusted with the management of the public revenue. It was no doubt a prudent step to decline appointing a successor to the lucrative office held by Mr. James Disraeli at the Inland Revenue, by which there was a clear gain to the country of about £1,200 per annum; and if the measure of reform about to be introduced by Mr. Gladstone is carried on in this fashion, there will be little opposition or ground for complaint. Even then we should be glad to hear that the revenue derived from the abolition of these sinecures was to be distributed amongst those branches of the Service which are notoriously hardworked and underpaid. The commissioners entrusted with the reconstruction of the Civil Service are able and well-tried servants of the crown, and each has, in his way, a full knowledge of the duties and responsibilities required from a Government clerk. In the hands of Mr. Stansfeld, Mr. Childers, and Mr. Scudamore, the Civil Service will, we believe, have fair play. There is a vast deal of cumbrous machinery that may easily be got rid of. *Duties that are done twice over because red-tapeism still exists in some quarters, and offices that are extravagantly remunerated without any work being done at all for the pay, may, and doubtless will, be reorganised.* No one can possibly object to a thorough rearrangement of these offices, but if the Government are in earnest they will commence with the highest salaries and work gradually down. Without reference to the political bias of Mr. Disraeli, it must be admitted the Civil Service always found in him a sincere and generous advocate. Through his exertions the superannuation-tax, which pressed so heavily upon Government servants, was abolished, and, when Chancellor of the Exchequer, he decided, contrary to previous practice, that a Civil servant should be allowed to retire upon the time he had actually served, and not be subject to having a portion deducted, as was formerly the case. It is not surprising, therefore, that the Service, bearing in mind the equitable treatment it received from the friends of the late Government, should view with apprehension a system of reform which may be disadvantageous to its best and most important interests, for the Civil servant can scarcely be expected to regard with favour any scheme by which the country can revel in a surplus at his expense.

For some time past this journal has done its best to expose the trickeries resorted to by advertising money-lenders, more especially as regards the "offers of assistance" addressed to officers in the army. It is well known, however, that these harpies infest the public offices almost to as great an extent as they do the various military stations in the kingdom. Through their agency many young men doubtless have been ruined, as will always be the case in any other profession where these money-lenders can fasten their fangs; but we think, taking into consideration the vast number of *employés* in the Civil Service, that cases of insolvency or bankruptcy have been far less frequent than in any other profession. We are quite ready to believe that young men upon entering the Civil Service are subject, as in the army, to great temptations, which unfortunately they are unable to withstand, and which, of course, lead to their ultimate ruin. The treasury minute recently issued points out very clearly that their lordships' attention has been directed to "the number of persons, discounters of bills, who, taking advantage of the inexperience of young men when they first enter the public service, and inducing them to put their names on bills, supply them with money at exorbitant rates of interest, in the expectation that, by threats of exposure and conse-

quent dismissal of these young men, their parents or other relatives may be induced to discharge these exorbitant demands." We are glad to find that the Treasury has thought fit to waru its subordinates of the peril they incur by lending a willing ear to these money-lenders, and it is to be hoped that not only will the heads of departments, but also the junior members themselves, co-operate in repressing the evil by at once discountenancing a system that sooner or later must lead to utter ruin. It is some consolation to find the Lords of the Treasury admitting that, at the very outset, appointments in the Civil Service are now made the reward of merit, and that promotion by merit is the established rule of the service. Such being the case, it is not too much to expect that these appointments should be equitably paid for. An expensive course of education is unquestionably necessary to compete successfully for these appointments; an unblemished character is equally essential, and a faithful and diligent discharge of duties when appointed absolutely demanded. If these are fairly rendered by the Civil servant, he has a claim to honorable treatment at the hands of his superiors; and we shall be pleased to find that Mr. Gladstone, while bearing in mind the pledge he has made with regard to the economy and retrenchment of the national expenditure, is also sensible of that which is clearly due to the Civil Service of the kingdom.—*Broad Arrow.*

IRISH POTTERY AND PORCELAIN.

THE Belfast Naturalists' Field Club met on Thursday evening last, at the Museum. Mr. William Gray read a paper entitled, "A Visit to Belleek Pottery." In tracing the history of the art he described the characteristic of Egyptian, Grecian, and Roman pottery, and referred to the several potteries established by the Romans, particularly those of Britain, and stated that some of the Irish examples of earthenware urns, &c., of a date previous to the Roman occupation of Britain, were some of the best examples of the kind found in Britain; and that they were constantly found in kists, tumuli, and other forms of sepulture. On referring to the Moorish enamelled ware and the works of the celebrated Pallissy, Mr. Gray said that several enamelled articles of personal ornament have been found in Ireland; but that antiquaries had not determined whether they were imported, or the result of native skill. One of the earliest potteries in Ireland was that established in Belfast at the close of the 17th century. Just then there was a vigorous competition between the Dutch and the British potteries; but they were confined to the manufacture of delft or stoneware; and in all probability the ware made at Belfast was similar to the common white ware of the Staffordshire potteries, such as was afterwards made at Youghal, in the County Cork. Brown ware was also made at Belfast; and there was a pottery at Larne. Those potteries have been abandoned for very many years. Brown ware is still made in large quantities by Messrs. Drury, at Youghal; and their ware is extensively used throughout the south. At Belleek, ordinary white stone ware of superior quality is manufactured; and also the best porcelain, not hitherto made in Ireland. Mr. Gray explained the nature and origin of porcelain, its introduction into Europe, and the development of its manufacture in England—particularly in Staffordshire, the great seat of the British potteries. All the clay used for the manufacture of porcelain in Staffordshire has to be brought from Cornwall, where it occurs in large quantities from the decomposition of the granite rock of the district. Eighty thousand tons are annually sent to the Potteries from Cornwall.

Granite is a compound of three minerals—quartz, felspar, and mica; and the Cornish clay, or kaolin, is an accumulation of the felspar from the decomposed granite, and has to be separated from particles of the mica and quartz, by labourious washing, &c. On the Castlecaldwell estate, where Belleek is

situated, there is no granite; but beds or veins of pure felspar occur over hundreds of acres; and it is from this felspar that the clay for the various kinds of ware is obtained. The very best kind of porcelain can be made from the Belleek felspar, for which the Cornish felspar is not suitable. Mr. Gray described several advantages possessed by the Belleek Pottery, amongst others, it has an ample supply of the most superior fire-clay from the sandstone, within about seven miles of the rocks. This clay is required to make the seggars or cases in which the ware is burnt, and must be capable of resisting a very intense heat, for want of material of this kind, some former British potteries had to be given up. The Belleek works were projected by Messrs. M'Birney and Armstrong, and the first ware was made in 1863. The extensive buildings and powerful machinery necessary for a complete pottery establishment have been constructed with all modern improvements. A large number of persons are employed, from the mere schoolboy up to the skilled potter, modellers, engravers, and painters in enamel; and a great variety of ware is produced. Mr. Gray exhibited a very extensive variety of articles manufactured at Belleek. Some of the most costly were sent up from the works for the purpose; and Mr. M'Cormick, of York-street, Belfast, sent specimens of the ordinary ware, such as tea, toilet, dinner, and dessert ware. Belfast or any other place may claim the merit of having first manufactured porcelain in Ireland; but whether they can establish that claim or not, is another matter. The superior quality of Belleek ware, both as to the excellence of the material, the skill and enterprise displayed in its manipulation, and the artistic merit of the designs, give it a special character, and declare it to be the first and only manufactory of the kind in Ireland. Mr. Gray described one interesting department of the Belleek works, where a large number of powerful presses are employed in the manufacture of such hollow articles as patch-boxes for ointment, &c., mortars for druggists, and similar ware, from dust-powder, by a process invented and patented by Mr. Armstrong, one of the proprietors. The mechanical contrivance secures an equal pressure in every part of the article, and, consequently, equal shrinkage and texture of material. The skill and enterprise directed to procure this machinery has been rewarded by extensive orders for insulators for telegraphs, of which many hundreds of thousands have already been sent out from Belleek, and are daily in process of manufacture.

CENTENARY OF THE CORK BUTTER MARKET.*

As with the present Irish butter season ends the first century of the Cork butter market, which was established in the spring of the year 1769, a few facts and figures connected with this, the greatest butter market in the world, may be acceptable to our readers. The port of Cork is the natural outlet for the produce of the most fertile district of the South of Ireland, extending over the whole of the county of Cork, the largest county in Ireland, and including portions of four other Munster counties—a district of about 3,000,000 statute acres, which, from a combination of favourable conditions, of climate, soil, and geological formation, is perhaps unequalled as a pasturing country. The climate of this southern district of Ireland is peculiarly genial and favourable to vegetation, partly owing to the influence of the Gulf stream, the warm waters of which break on its shores, and raise the temperature 3° higher than the northern parts of the island, a difference in temperature that is, generally speaking, uniform throughout the year, its influence being more perceptible in the spring, when the vegetation is considerably in advance of that of other parts of the country. A portion of the county of Cork enjoys a spring temperature of 50°, about the highest in the British islands, and 3° higher than the county of Kent, which is

nearly in the same latitude. The rainfall is great, owing to the moist and warm south-westerly winds, the vapour of which in passing over the land is changed into genial showers, increasing its fertility. The soil is principally on the old red sandstone formation, and is free from the bog or morass so prevalent in other parts of Ireland. The mild and open winters, allowing the longest period for grazing, render it most suitable for the rearing of cattle and the production of butter. The early rise of the Cork market may be attributed to its position in relation to this fertile district, to the constant and frequent communication between Cork and the different ports of England, and to the foreign and colonial trade created by the favourable geographical position and safety of Cork harbour, now better known as Queens-town. The total quantity of butter received into the Cork market for the century amounts to nearly twenty-five million packages; the actual number being upwards of 24,500,000, or over a million tons, a quantity more easily spoken of than conceived. The Cork butter market is held daily, with the exception of about fifteen days' interval in March or April between the old and the new seasons, and a few holidays. There are, therefore, about 290 markets held in the year. The average supply is now 1400 firkins per day, or 400,000 firkins annually. Within the last dozen years the exports to the colonies, which used to be large, have fallen off, owing to various causes, principally the increase of their own produce. The foreign trade is now small, the great bulk of the supply of Cork butter coming to the English markets. The Cork butter market is an indication of the great agricultural resources of Ireland—resources which, in the judgment of competent authorities, are capable of large development and increase, with rich promise, under wise and considerate legislation, of much prosperity and happiness to the people of a country so highly favoured by nature.

NEW STYLE FOR A CHURCH TOWER.

THE ugliest church tower of modern erection in the environs of London stands on one of the most commanding suburban sites. All who frequent Hampstead must have watched it during erection, and bemoaned its completion. The eye of the pedestrian catches it long before his foot reaches it, for it stands on the rise as you ascend from London. How came it there? It came because people who sat under the ministry of the Rev. J. D. Burns in a police-court-like building in Well Walk, Hampstead, determined to have a costly and beautiful church. Costly it was; beautiful it was not. Costly before the foundation of the ugly tower was laid, for the Dean and Chapter of Westminster disgusted the Scotch Presbyterians by refusing to let them lease or purchase a few roods of ground, and those enterprising Christians had to pay £2,500, as they allege, needlessly. However, the brick tower arose, square, massive, bastion-like,—like anything except a modern church-tower. So hideous was it at first that even Scotch taste was offended, and in time the water-butt roof received two dove-cot additions, rendering the whole suitable to a dozen of Dr. Darwin's transmuted pigeons. After all, how came it that, having money at command, the Presbyterians contrived to exhibit a perpetual eyefore in bricks and mortar? How was it, too, that having for their minister a man of taste and a respectable poet, they suffered the most prosaic and repulsive of all imaginable buildings to stand like a huge watchman's box? These questions we have put to ourselves and others a hundred times without obtaining any satisfactory reply. One inference is clear—that though a minister may be able to "build the lofty rhyme," his architect may be unable to build a lofty tower. Certainly it has the merit of originality, for never have we seen church-tower like it, though we have been told that there is one in the Orkney Isles. So long as it lasts, may it be our only specimen of the Early Orkney style!—*Athenæum*.

LABOURERS' DWELLINGS IN LIVERPOOL.

THE Liverpool correspondent of the *Builders' Trade Circular* says:—The first portion of the Corporation scheme for erecting dwellings for labourers is approaching completion. It will be remembered that plans prepared by Messrs. Redman and Hesketh were duly submitted to the council; and the contract of Mr. Hugh Yates, of 26, Bute-street, to erect the dwellings, having been accepted, the work was commenced on the 7th of April, Mr. Christian acting as the clerk of the works. With the exception of painting, some of the blocks are already finished, and the entire work of the contractor will be completed in April. The houses, numbering 146, are divided into six blocks, and will be numbered from A to F. The front block, consisting of houses of five storeys, faces Silvester-street, and similar erections face Ashfield-street. In the centre two other blocks are built, but these are only three storeys in height. From street to street an asphalted road, 30 feet in width, is formed, and, when completed, the courts between each block, 25 feet in width, will also be asphalted. The walls are built of very hard, common brick, with red and blue bands, and heads, the whole surmounted by a cornice in red, white, and blue bricks. The sills of the windows are of red sandstone, and the staircase and landings of Yorkshire stone. Adopting the Scottish system, the buildings are so erected that each series of rooms, called a flat, is entirely independent of the other parts of the block. The only thing common to each house is the staircase. The flats vary in size, from the largest, which include a dwelling room, three bedrooms, and a scullery, to the smallest, consisting of one sitting room, one bedroom, and a scullery. The rents will, of course, vary according to the accommodation afforded, and they are expected to range from 2s. 9d. to 6s. per week. In every dwelling room there is an oven and range, with small cupboards, and a row of hat or coat pegs, and in the better houses two out of three of the bedrooms have fire-places. The sub-committee of the health committee, who have had the management of these erections, have kept prominently before their minds the importance of combining sanitary arrangements with these domestic conveniences, and they have constructed a water closet for each tenant, supplied by very capacious cisterns placed in the roof over the staircase. A fair opportunity will thus be afforded of testing the truth or falsehood of the charge that the poor cannot be trusted with water closet apparatus, because they will be continually breaking some part of the machinery and putting the closet out of repair. An ash-spout reaches from the upper floor to the base, to which each tenant has access on his own premises, so that he has but to open an iron door and the ashes are immediately thrown to the bottom. The buildings have been erected at a cost of about £16,000; and from, the tenancy, the council expects a net annual equivalent to 3¼ per cent. upon the outlay, together with 1 per cent. for a sinking fund, so as to repay the borrowed money in 40 years. As I have said, the houses number but 146; but, so strong is the desire to secure occupation, that upwards of 300 applications for tenancy have already been received.

LEAD.—The quantity of lead ore raised and sold in the United Kingdom last year was 94,432 tons, of the value of £1,158,066; the quantity of lead produced was 68,441 tons, of the value of £1,337,509; and the quantity of silver obtained was 835,394 oz., of the value of £215,400. About two-thirds of the production of lead are obtained in England, about a fourth in Wales, and the remainder in Scotland, Ireland, and the Isle of Man. The mean price of lead ore at the Holywell sales in 1867 (rejecting a few low priced parcels) was £12 17s. 6d. a ton. The average price in the London market of English pig and sheet lead was as follows:—For English pig £19 11s.; English sheet, £20 12s.; English pig, (W.B.), £22 1s.; all three lower than in 1866.

* Extracted from an article in the *Grocer* of 2nd inst.

IMPROVEMENTS AT THE ANGEL HOTEL, INNS-QUAY.

WITH this number we give as an illustration some sketches of a new billiard-room and other additions to the Angel Hotel, carried out under the direction of Mr. T. Hevey, for Hugh O'Rorke, Esq. The old buildings which existed on the site have been cleared away, and the space heretofore used as a yard has been added to the billiard-room, thereby providing room for two tables. The old roof of billiard-room is stripped off, and the new one, as shown in the sketch, is substituted.

The front building was designed for a bar on the ground floor, but we believe for the present it will be used as a stock-room. On the first floor is a stock-room, to which a lift is provided at staircase. The billiard-room roof is exceedingly plain and simple in its construction, and the effect of it, to judge from our view, will be remarkably good. It is proposed hereafter to decorate the walls in colour, and to stencil the beams, &c., of roof. The contractor for these works is Mr. James Donovan, of Kingstown.

THE ANTIQUITIES OF PARIS.

THERE is sad work going on amongst the relics of old Paris. The Paris correspondent of the *Telegraph* relates a circumstance to illustrate this. M. Recappe, a well known amateur and dealer in works of art and *virtu* having heard that a considerable quantity of carved wood had been sold as rubbish, hurried to the spot. One glance at the confused heap in a corner of the yard was enough for M. Recappe. The contractor asked 1,200 francs for the lot, and the amateur paid the money down. On examination, this shag pile of firewood turned out to be an inestimable treasure—no less than the whole of the wood-work which had decorated the old reading-room in the "Bibliothèque Impériale," a marvel of artistic workmanship, supposed to have been designed and carved for the great Colbert. When the woodwork had been cleansed of all impurities, even Recappe himself was astonished. The carvings were voted, by competent judges, to be among the finest productions of the reign of Louis XIV., and were purchased soon afterwards by M. Maillet du Boulay, a rich amateur, for the sum of 8,000f. Another instance of like enormity happened three years ago. A wrought-iron balustrade was taken down from the grand staircase of the same "Bibliothèque," and was also sold by weight to some *Auvergnat*. A goldsmith of Gonesse saw it, and became its happy possessor for the sum of 1,200f. On being told of the affair, the inevitable M. Recappe went immediately to Gonesse to make himself, at any cost, master of the balustrade, which is said to be one of the most wonderful specimens of wrought-iron in existence.—*Builder*.

MECHANICAL ARTS.

IRONFOUNDING.

(Continued from page 6.)

THE pipe which conducts the air from the fan is divided into two branches, and delivers the blast into the furnace through two apertures facing each other from opposite sides. The pipes which deliver the blast through the sides of the furnace are called the "tuyeres." Though two tuyeres are most commonly adopted, the number may be increased up to six or eight, and ranged all round the furnace. Before the introduction of the fan, cylinder bellows were used driven by a steam engine, but the fan was found much the simplest and most economical. The blades of the fan make about 700 revolutions a minute. Tinkers who travel through the country and cast small articles, obtain a sufficient blast for their purpose by using a common smith's bellows; of course their furnace is very small, being about 10 inches dia-

meter and 3 ft. deep; it is built of brick, and lined with common clay; the fuel used is founders' coke, and in some cases Kilkenny coals.

The ordinary furnace or cupola used by iron-founders is made of various dimensions, according to the extent of the work carried on; the smallest size would be about 16 inches diameter and 8 feet high. It is considered that there is a saving of fuel by making the furnace tall. The greatest heat is near the tuyeres, where the strength of the blast comes in contact with the fuel, so that the taller the furnace the more material can be piled above the tuyeres to exhaust the heat carried upward with the blast. The furnace consists of a circular wall of fire bricks about 9 inches thick secured in a wrought-iron or cast-iron case; the bricks are lined on the inside with fire clay.

The annexed figures represent the furnace.

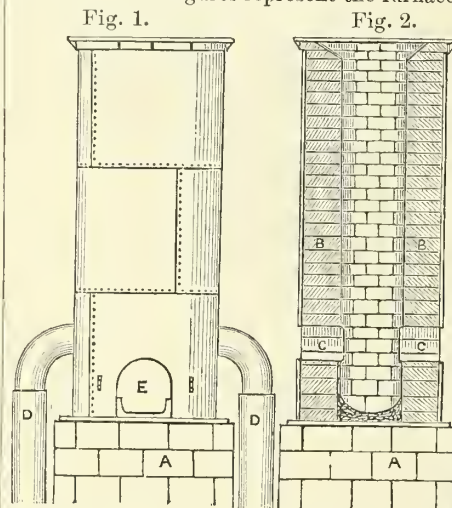


Fig. 1 is a front elevation, and fig. 2 a vertical section, *a* is the pedestal or basis on which the furnace stands, *b b* the fire bricks, *c c* the apertures through which the tuyeres are introduced, *d d* the pipes which convey the blast from the fan, *e* an opening left in the front of the furnace at the bottom through which the coke is withdrawn after the work of casting the molten iron is completed. It is through this aperture that the liquid metal is allowed to run out of the furnace; it also serves for general access to the furnace. Some furnaces are so constructed that when the casting is ended the support of the bottom can be removed and the coke allowed to fall vertically into a pit beneath.

The fuel is kindled by placing a few chips of wood or pieces of turf on the bottom, leaving the aperture *e* open; the furnace is then filled up with coke about three-quarters full or so according to its size, after which alternate layers of iron and coke are laid on as the fuel sinks in the furnace. The pigs are broken into pieces of about 14 pounds weight before they are put in; there are a few pieces of limestone put in along with the iron to act as a flux—chalk and oyster shells are sometimes used for the same purpose. The fire is lit at *e*, and when the fuel has sufficiently kindled the aperture *e* is rammed up tightly with sand which has been moistened with claywash; the sand is supported at the front with a guard plate, and at the inside by the fuel. There is a small orifice about 2 inches diameter left open in the bottom of the aperture *e* for the molten metal to run out through; this orifice is left open for some time after the blast is turned on, so that the blast which issues out through it may carry down sufficient heat to harden and consolidate the sand around it; when this is accomplished the orifice is closed with a plug of moist clay. According as the iron melts it falls to the bottom of the furnace. When it is thought that a sufficient quantity of metal lies on the bottom, the clay plug is bored through with an iron rod,—this is called tapping the furnace; when the liquid metal rushes out it is conveyed by a gutter lined with and to iron ladles or shanks likewise lined with sand, from which it is poured into the moulds.

A LESSON IN FIREPROOF CONSTRUCTION.

THROUGH the kindness of Messrs. Michael Meade and Sons, the eminent building firm, Great Brunswick-street, we are enabled to lay before our readers a few facts relative to the peculiar effects of fire upon some of the building materials procured in the vicinity of Dublin.

The extensive premises belonging to this firm has recently been the scene of, perhaps, one of the greatest conflagrations ever witnessed in the city, and therefore may be taken as affording a practical and instructive lesson to architects, builders, and all classes engaged in the building profession.

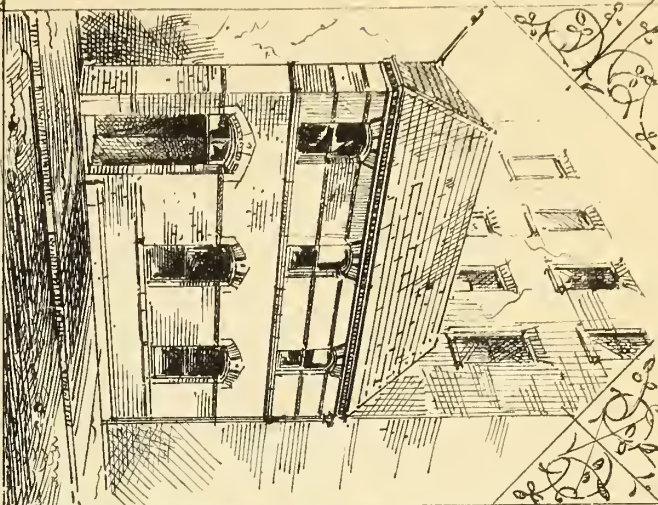
The immense quantities of timbers that were stored in the concerns, together with the workshops and sawing department, were in the course of a few hours completely reduced to ashes, and a large number of carts, waggons, derricks, hoists, and building appliances, shared a similar fate.

The excessive heat of such burning piles must have been very trying on the walls and piers, around which the flames raged with unabated fury as long as a particle of material remained to be consumed. Girders, lintels, roofs, floors, fixtures, benches, and seasoned shop timbers—all blazing through the apertures—gave the operative department the appearance of a huge furnace ejecting the fiery element, and sowing destruction broadcast, scarcely acknowledging the effects of the powerful and well-directed jets of water from the hose pipes. These jets, however, were instrumental in saving the magnificent office buildings at the entrance in Great Brunswick-street, the engine-house and smithies, and in keeping the flames so surrounded as to confine their action to the smallest extent possible, but not until they had done considerable damage to those places.

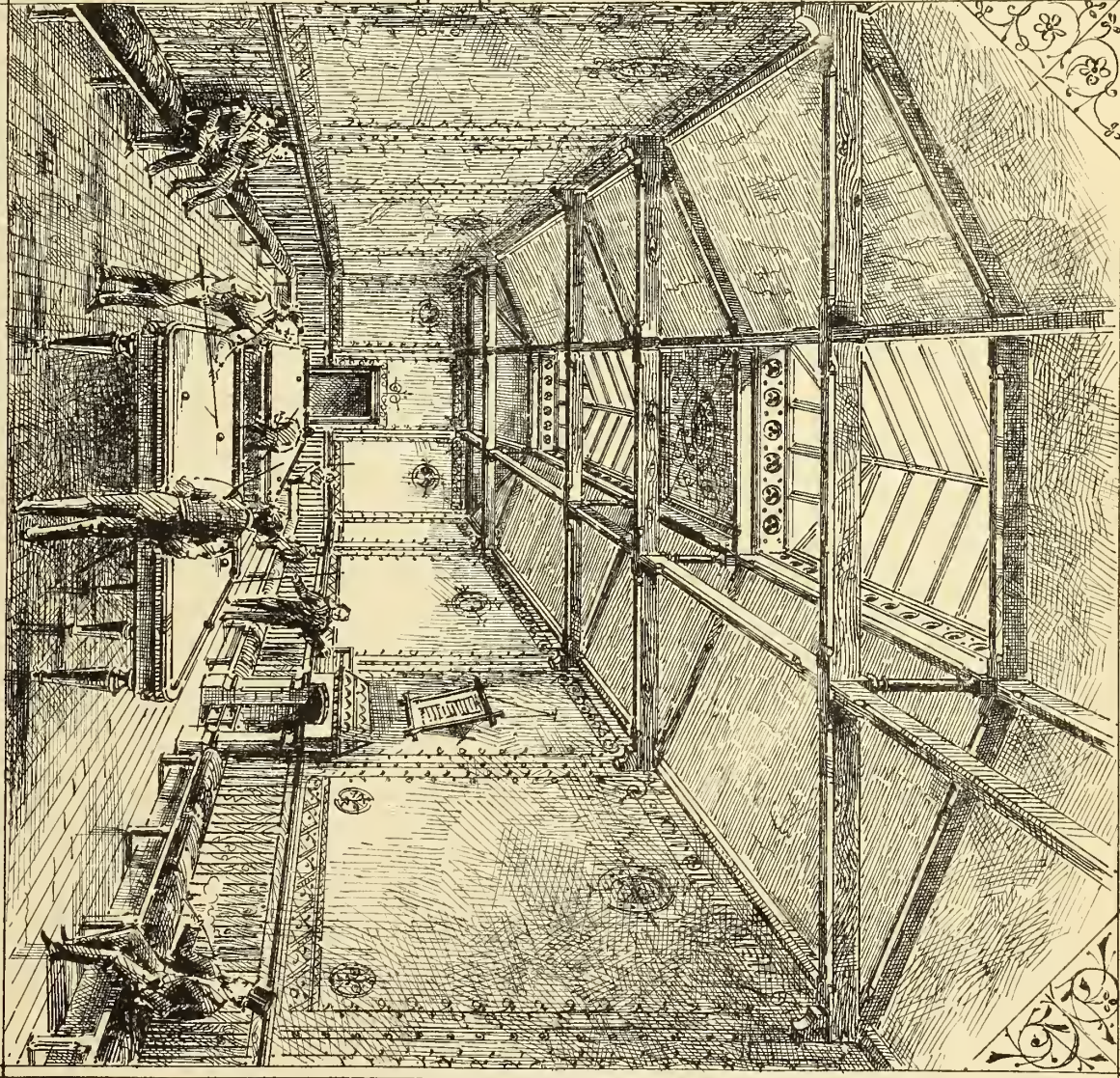
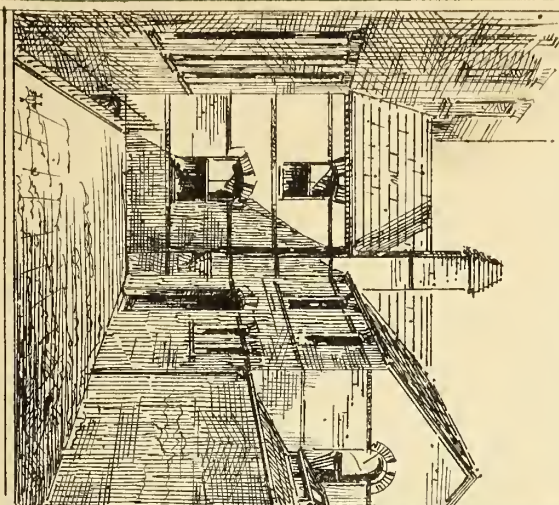
Shortly after the occurrence of this fire we called to see the premises, and to note the changes that the masonry had undergone. Mr. Meade kindly showed us through, and pointed out the unmistakable ravages made in the different departments. The machinery suffered seriously, the heavy wrought-iron shaftings having been bent and twisted into the most irregular forms, and the massive cast-iron supports buckled and curved in every direction. Workmen were employed clearing out the site, and preparing for the erection of new fireproof buildings, to replace those that had been destroyed, which were constructed in the ordinary way—wood entering largely into their composition.

The masonry of the walls and piers would have withstood the effects of the fire, were it not for the action of the water from the hose pipes upon its heated surface. But this action greatly disfigured it, as well as endangered its stability by causing fractures and bursting through the stones wherever they were exposed to the compound influence of fire and water. The quarry from which these stones were obtained is that known as the "Red Cow," situated about five miles from the city; it yields a beautiful stone, of a greyish-black colour and close texture, which, being rubbed with sand and water, presents a good surface, but will not bear out a fine polish. This stone stands the weather well, will not readily calcine, and therefore it is a safe material for general building purposes. If heated to a high temperature, and allowed gradually to cool, it will exhibit but little defect; but if heated and then plunged into water, it will burst into irregular pieces. There is another description of stone in these quarries that partakes somewhat of a slaty or laminated nature, but this is not so good a weather stone as the former. It is a singular fact, however, that this laminated stone placed on its edge, having its natural bed so disposed as to form its face, effectually resisted the combined action of fire and water, while stones of the former class setting on either side of it were burst and scaled in a remarkable manner;

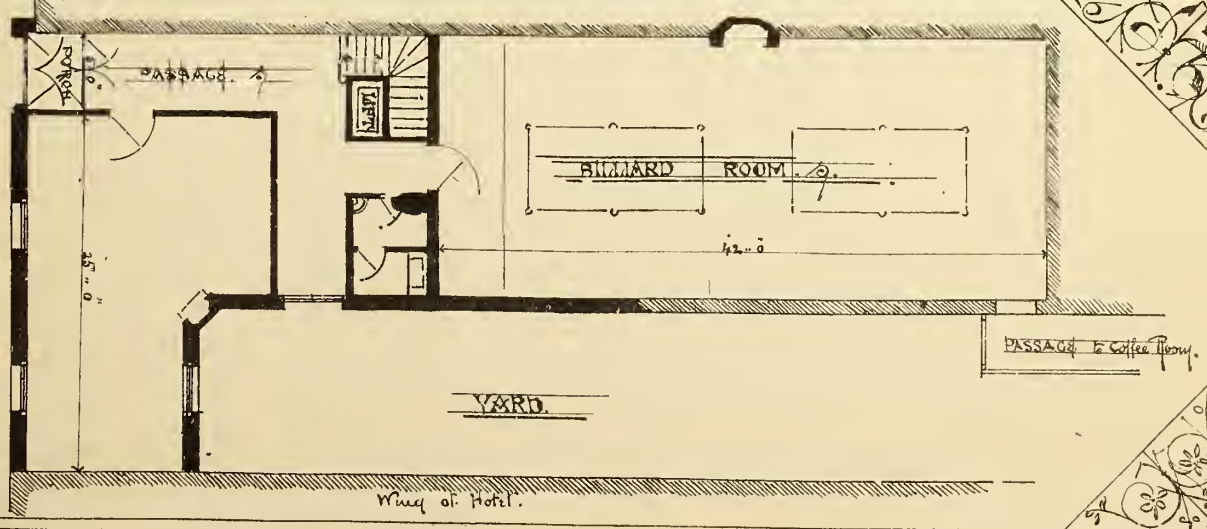
VIEW FROM THE COURTY.



VIEW FROM THE LODGING ROOM.



VIEW BILLIARD ROOM AND OTHER SPORTS
OF THE PRINCE-OF-WALES INN, DUBLIN.
FOR HUGH O'ROURKE ESQ. J. P. MURPHY ARCHT.



PLAN

Shows old wall.
New.

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and in every part of the walls that these stones were set a similar result was observable, except in places that were not reached by the water, where both sorts maintained their original firmness.

In the appendix to "Observations on Mr. Archer's Statistical Survey of the County of Dublin," by Hely Dutton, the author, speaking of the "Cursis-stream" stone, that is similar to this, says:—

"It excites an ebullition with spirit of vitriol, but less than limestone. Kept ten hours in the fire, lost its black colour, but did not slacken with water nor acquire the taste of lime."

And further on he says:—

"At the 'Red Cow,' near Dublin, where are quarries of these stones, the workmen in their language distinguish one sort of stone by the name of *wallers* or *waller*; and I found upon trial that these were such as consisted more of a flinty than a calcareous matter; that they struck fire with steel, and made no ebullition with acids; such stones bearing the weather, and therefore being fit for building of walls where they last long, quite otherwise than the flaky sort, and even than ordinary limestones, which moulder in the air and are rather fit for the insides of buildings where they are not exposed to the air. This stone, on its ebullition with spirit of vitriol, stinks for the reason given. This quarry also supplies headstones, tombstones, hearthstones, and flags, and the steps going up to Paul's Church, London, are said to be made of this last."

From the foregoing it is evident that these stones are capable of resisting, in no small degree, the action of fire; and that their yielding in the present instance, if not altogether, is at least partly attributable to the application of water to their surfaces while in a high state of temperature.

We will notice the effects produced on the granite and brick in a future number.

THE GEOLOGY OF ISLANDMAGEE.

THE above was the title of a paper read before the Natural History and Philosophical Society, Belfast, by George V. Du Noyer, Esq., a short time previous to his decease during the present month. He exhibited and explained the worked 6-inch maps of the southern bed of the promontory of the Ards, County Down, those of the district between Ballygally Head and Carrickfergus, including Larne Lough and Islandmagee, and also those of the country to the S.W. of Newtownards, including Scrabo Hill. He also gave a short account of the origin and progress of the Government Geological Survey, and pointed out its value to the country in a practical or utilitarian point of view; giving instances where a lavish expenditure of money had been made in searching for coal and other minerals, when such would have been saved if the speculator had consulted a well-informed geologist, or if such geological maps as those exhibited had been constructed and referred to. The remarks on Islandmagee were admirably illustrated by water-colour drawings made by Mr. Du Noyer from his own sketches, and very many geological sections aided in making clear the interesting subject of the lecture. Of the most salient points of interest, we noted the description of Whitehead, a locality which should be first studied before the geology of Islandmagee could be thoroughly understood. Here the lecturer explained that we had evidence to show that the upper surface of the chalk had been eroded by atmospheric agencies into deep hollows, and the flints then set free by disintegration filled up their cavities. The surface of the chalk was then depressed beneath the sea, which swept over it a fine ferruginous sand, sometimes containing numerous pebbles of hematite, and this formed a matrix in which the flint nodules became agglomerated; the top of this deposit was then itself eroded, sometimes to such an amount as to bare the chalk, and on this sandy submarine eroded surface the basalt was poured out and accumulated to the thickness of about 1,000 feet. The basalt itself was then eroded to such an amount that in some instances it was swept clean off the chalk, and at Whitehead only 25 feet of it was left in its normal position. On this third eroded surface the sea-drift was

laid down, and this itself was acted on by rain and rivers till the present surface was formed. The lowest rock seen at Whitehead was that group of the trias or new red sandstone, known as the keuper marls, and it formed the base of all the rocks constituting Islandmagee, which, in fact, was the epitome of Antrim geology. The unconformability of the Rhoetic beds and the overlying liassic rock to the keuper marls, and the singular fact that the green sand at the base of the chalk lay itself unconformable to the lias, was pointed out and explained. Some most singular dykes of trap, which, from their structure, were described as ropy or twisted trap, were illustrated. The remarkable land-slips to be seen on the east coast of Islandmagee for a distance of nearly one mile to the south of the Gobbins, were illustrated and well explained by a moveable diagram. One of the sections, showing the geological structure from Bella-hill on the west across the hills to Larne Lough, and Islandmagee on the east, showed most clearly the interesting fact, that hills of geological elevation often become valleys of atmospheric denudation. This was explained by the fact that here the strata has been contorted into gentle undulations, while yet deep-seated; and when the upheaval of the land took place the denudation went on evenly till the covering of the basalt was removed, and the chalk reached on the summit of each contortion. The chalk then freely gave way before the destructive agencies brought to bear against it, and valleys were soon formed, bounded by the basalt, and then became wider and wider as the atmospheric denudation progressed. This accounted for the formation of the Valley of the Weald, in Suffolk, about which so much had been written. Allusion was made to the occurrence of a conglomerate formed of rolled pebbles of hematite magnetic iron ore in the basalt on the west side of Brown's Bay, and it was clearly demonstrated that the origin of this deposit was entirely due to the action of water. It was as true an aqueous conglomerate as if it had been found in the heart of the old red sandstone. This interesting fact was not known or properly understood in the history of this iron ore till he proved and explained it from observations made on a quarry in the demesne of Castle Dobbs, and at the workings for this ore on the Northern Counties Railway, near Ballypallid station. At the latter place he was fortunate enough, some short time since, to discover plant impressions in the red earth or lithomarge lying on and in this hematite conglomerate. This discovery settled not only the origin of this ore, but also the very age of the basalt, which was thus shown to be miocene, as Paleontologists have pronounced such to be the geologic age of the plants. The discovery of plant impressions in strata interstratified in the basalt was first made about five years since by the Duke of Argyle in the island of Mull, and the plants found in Ballypallid lithomarge are precisely of the same generic character. In order to more fully explain the work which has been accomplished, under the supervision of Mr. Du Noyer, by the survey in the district of Newtownards, which was surveyed by Mr. J. L. Warren, C.E., A.M., and that in the promontory of the Ards, surveyed by Mr. W. A. Traill, C.E., A.M., in a manner highly creditable to those gentlemen, and at the same time to correlate his own work in the district of Holywood and Carrickfergus with that alluded to, a large section was exhibited, showing the geological structure of the Commons of Carrick on the north, through Duncrew salt mine, across Belfast Lough to Holywood, and from thence through the high ground to the south of it, and past Newtownards through Scrabo Hill to Castle Espie Limestone Works on the south. This most interesting section showed the relations between the lowermost rock seen on the shore at Craigavad, which Mr. Du Noyer discovered to be Cambrian, on the denuded surface of which rests the lower silurian strata, which, by detailed observations, amounts to the enormous stratigraphical thickness of fully three miles, as seen by the shore to the north

and south of Bangor in Down. Next was shown the relation of the carboniferous shales, the permian sandstone above them, and the Bunter sandstein, or new red over all, as observed on the shore at Holywood and at Scrabo Hill, which latter was shown to belong to the water-stone group or upper Bunter sandstein. Some questions were asked as to the possibility of the basalt having by its heat hardened the underlying chalk. This conclusion, so often arrived at, the lecturer utterly dissented from; and he showed that on the upper surface the chalk was covered by a marine drift, and that this again was overlaid in places by a bed of impure lignite or carbonaceous matter, as he first observed in the early part of last summer at M'Garry's quarry, near Lisburn. That all this was evidence sufficient to show that the basalt transmitted no appreciable heat downwards, and was, no doubt, poured out over the eroded surface of the chalk while that rock was under water. Speaking of the power of rain and rivers, ice and snow, and the sea, to wear down whole continents, the lecturer remarked that if no compensating upheaving power acted as a counter power to these disintegrating agencies, the day would come when Islandmagee would find its grave in the bosom of an ocean, and quoted the celebrated lines of Tennyson, written with the light of science beaming upon his mind—

"There rolls the deep—there grew the tree,
O, earth what changes hast thou seen;
There, where the long street roars, hath been
The stillness of the central sea.

"The hills are shadows, and they flow
From farm to farm, and nothing stands;
They melt like mist—the solid lands,
Like clouds, they shape themselves and go."

NORWEGIAN COOKING APPARATUS.

THE Hon. L. H. King Harman informs us that he has had trials made under his own superintendence of this newly invented cooking apparatus. As the result of one trial he states:—Having a shooting party of about seven gentlemen at Newcastle, Ballymahon, I had a proper quantity of Irish stew made up in the usual manner, put down on the hot hearth in the largest of the tin vessels, when it came to a boil in thirty minutes; it was then kept boiling fifteen minutes longer, when it was rapidly taken from the hearth and placed in a machine with a quantity of extra potatoes in the other two tins, which last tins came to a boil in about half the time of the larger one. The box was then locked up and sent in a cart after the shooters, when, in two hours and a-half, on being opened and turned out the gentlemen found all the contents most perfectly cooked, steaming hot, and most excellent. This afforded as much as the seven could eat, and was also sufficient for the head keeper and some of his assistants. This machine will cook anything which can be boiled, as meat, fowl, vegetables, dumplings, &c. I considered it a most complete success, and that it will prove a useful companion to all persons obliged to move about, and not able to be at home for comfortable, hot, and regular meals, as railway guards, land agents on inspecting expeditions over the properties under their charge, shooting parties, commercial men, pic-nic excursionists, &c.; and last, not least, it would prove of the utmost value to our army, and when made on a large scale it would do well to accompany the new water-transport cart, and afford excellent refreshments to our soldiers after a heavy march, an exhausting field-day, and a well-fought battle, when a hot and comfortable meal would go far towards restoring the strength and maintaining the life in many a wounded man. The great utility of these machines will plead my excuse for trespassing on your columns. They only require to be known and properly tested in order to be highly prized and valued. The smallest size would prove most useful to tradesmen, as carpenters, stonecutters, &c., working on buildings, &c., far from their own homes, before leaving which, when at their morning meal, their wives or children could prepare their dinner, which they could find well cooked, hot, and comfortable when required."

THE LIFE AND LABOURS OF GEORGE PETRIE, LL.D.*

DR. PETRIE deserved the happy fortune of cracking the antiquarian nut with which his name is chiefly associated; and it is hard to say more than this; for his able, learned and logical exposition of the nature, uses and origin of the Round Towers of Ireland is only just not wholly unchallengeable. It is fortunate for Dr. Petrie that the latest discovery ament his favourite study, the Round Towers, goes far to support at least one of the explanations which he gave for the uses of those edifices. Although we noted the matter at the time, it may be well to remind the reader that the use of these towers as dwellings was proved by the finding of staples of metal and the lead with which shutters had been attached to the sides of the window-openings of one of the towers. It is hardly conceivable that such things were not observed before.

Some of Dr. Petrie's forerunners said these towers were the abodes, others that they were the tombs, of the African Sea-Champions, whoever they might have been; then they were described as Phœnician towers as designed for the Holy Fire; Sorcerers' towers; astronomical observatories (!); pillars for dancing round in Canaanitish fashion; gnomons; temples of Vesta. They were supposed to have been Archi-Druidic; Danish watch-towers, where the Danes harried and flayed, but never lived long; Phallic temples, or sepulchral monuments; they were treasuries of mighty Irish sovereigns; beacons for travellers' guidance; and, lastly, belfries. It was said that the best test for the sanity or insanity of an Irish antiquary was to ask him his opinion about these wonderful erections. Folk said they were Persian, African, Indo-Scythian, Egyptian, Greek, Sardinian, Hindoo, Chaldean, Guebre, Pelægic, Hebrew, Gnostic and Druidical. Zoroaster was not too remote, Buddha not too early; the Magi and the Outhites were not too little understood, the Eleusinian mysteries not too recondite or abominable, to allow claims to the honour of building these strange works, which are certainly Christian, ecclesiastical, occasionally monastic, and sometimes, if not always, defensive; and by no means to be referred to an older date than the twelfth century. Wonderful as are the wilder theories, still more wonderful is it that since Dr. Petrie's death, a bold man appeared who declared these structures to be works of the sons of Ham, *i. e.*, Cyclopeans, Centaurs, or Demons, as the case might be!

Dr. Petrie was the son of a portrait-painter of Dublin—himself a man of Aberdeen, he was born in 1789. He was a pupil with F. Danby in the Drawing School of the [Royal] Dublin Society, and in 1808 wrote descriptions of stone circles on the Wicklow Mountains. He came to London long enough ago to have called upon West while painting his 'Christ before Pilate.' F. Danby and O'Connor—a very promising landscape-painter, were of the party in this visit to London. The former used to tell with much feeling how Petrie, knowing how dire was the impecuniosity under which his friends then suffered, compelled them to receive from him two valuable rings, which they might turn to cash if needful. Needful this help must have been, for Danby and O'Connor walked to Bristol on their way back to Ireland, and arrived with barely enough to pay for a lodging. Danby made three drawings, and sold them to a stationer for a guinea; by the like means he started O'Connor for Ireland. Danby had already (1812) exhibited a picture in Dublin, 'A Landscape—Evening,' which gave promise of the painter of the awe-striking 'Upas Tree,' now at South Kensington, and recently described by us, 'The Evening Gun,' and 'The Painter's Holiday.'

Petrie was so good an artist as to have supplied nearly a hundred of the illustrations to 'Cromwell's Excursions in Ireland,' and scores more to publications of the topographical sort. These studies continued for

many years, and brought him into a good professional position. In 1830 he was appointed Librarian to the [Royal] Hibernian Academy, and exhibited six pictures in the gallery of that association. To that of the following year he contributed nine works. In 1831 he visited the Isles of Arran, then utterly strange to the artist and antiquary. He may be called the expositor as well as the illustrator of these out-of-the-way nooks of Irish scenery and their ancient remains; the fame of Clonmacnoise also is due in no small degree to his studies and learning. This volume is enriched by many extracts from his journals of visits to the above-named and other interesting sites. As to Clonmacnoise, he was among the first to complain of the debasement into which the people of Ireland had fallen, so that they did not scruple to destroy or injure such relics of the boasted civilization and labours of their ancestors. While Irish bards were singing about the grandeur and valour of the ancient races of their country, the common people were ruthlessly destroying the antiquities upon which rested the real honours of the island; Petrie recorded the existence of the seven sanctuary crosses of the old establishment at Kilfenora, of which five then remained; three of these have disappeared since he described them, 1821. In the Isles of Arran, on a second visit, he found the hive-like huts, similar to those which dot the land in Devonshire, Cornwall, and Wales; also "gigantic forts of uncemented stone" rearing their ruined crests above the ocean, or crowning some central point, each with circumvallations and sometimes with *chevaux-de-frise* of upright stones, Culdee buildings of the earliest date, with groups of collegiate churches and other structures, including the wreck of the Round Tower of St. Enda. He testified to the still primitive and simple character of the people of these islands, such as it was described in old traditions. This work contains a very striking description of these folks and their habitations, including the eccentric doctor of the place, who was also the chief, if not the only tailor, and was suspected of having been "out" in '98. Tim O'Flaherty, such was this jovial and learned fellow's name, proved himself a hero in medicine when some dreadful cases of typhus came to his hands.

So long ago as 1816 Dr. Petrie became a contributor to the antiquarian literature of his country. He made his first essay in *The Dublin Examiner* of that year. *The Dublin Penny Journal*, a sort of Irish Penny Magazine, reckoned Petrie among its worthy contributors. By its means he endeavoured to arouse the popular mind in the country to a sense of duty towards the antiquities which he loved so well and so freely elucidated. Monasterboice was one of his favourite subjects then and afterwards. In connexion with the [Royal] Hibernian Academy he gathered whatever was obtainable of Irish MSS. In the exercise of his trust he discovered the second part of the 'Annals of the Four Masters,' then an unnamed and neglected document, now of the highest value and interest. The Southwell collection of MSS., and that of the Chevalier O'Gorman, were purchased under his auspices. The former is, like that vast treasure of historical documents which, by means of the author of 'New America,' has recently found its way home again from America, rich in records of the seventeenth century in Ireland, comprising State Papers of James the Second, which had found their way to Holland, and remained there during several generations. The collections of Sir W. Betham and Messrs. Hodges and Smith are among the treasures which Petrie gathered for public use.

The Museum of Antiquities and the Manuscript Library owe deep obligations, as well as their origin, to our subject. From 1833 to 1846 he was connected with the Ordnance Topographical Survey of Ireland, and enriched it with the results of his studies. In the same period he produced his 'Antiquities of Tara' and 'The Ecclesiastical Architecture of Ireland.' An idea of the extent of the labours involved in the Survey in which Petrie

had so large and important a share may be obtained by learning that, when the staff of the Survey was dispersed, no fewer than 468 quarto volumes of letters and documents relating to the topography, language, history, antiquities, productions and social state of Ireland, were laid aside. About a fourth of this invaluable mass is deposited with the Royal Irish Academy, there to remain it would seem. These were the great labours of a well-spent life.

IMPRESSIONS OF THE SOUTH AND WEST OF IRELAND:

ITS SCENERY, CASTLES, ABBEYS, LAKES, AND
MOUNTAINS.

LATE in the fall of the past year I had occasion to make a hurried visit to Waterford, Limerick, Ennis, Galway, Westport, Ballinrobe, Hollymount, &c. The following are amongst the "impressions" I formed on the tour.

My place of starting was Graige-na-managh (*i. e.*, Graige of the Monks), in the County of Kilkenny. The road is a very hilly one the entire way to New Ross.

New Ross.—This town is pleasantly situated on the River Barrow, which is about a quarter of a mile in width at the quays, where the bridge is being built which is to connect the counties of Kilkenny and Wexford. This means of communication will be a great boon indeed to the neighbouring populations. The quays and stores of this town are substantial and good, and deserve a better fate than their lonely and deserted appearance denotes.

Took passage in the steamer for Waterford. The majority of the passengers were R. C. clergymen and their friends going to Tramore at the heel of the season. There was one person in the group of whom I learned from a friend that his bishop, on first getting a sight of him, inquired—"Who is the Indian chief?" The Indian chief, however, has the repute of being amiable and religious; his foible is in the longitudinal dimensions of his well-curled and oily locks!

We get to Waterford in about an hour and a quarter from New Ross. With the exception of Dunbrody Abbey, there is nothing worth noticing till we enter the Suir. From thence up to the quay the banks are lined with handsome residences and parks.

Hurry on to the Waterford and Limerick Railway Terminus as soon as I get on *terra firma*, and obtain a through ticket to Ennis.

Waterford and Limerick Railway.—Waterford has nothing remarkable but its very fine spacious quays, and its antiquated nuisance, the wooden toll bridge, the only means of communication between Kilkenny and Waterford. The Waterford and Limerick Railway was doing a good business at this time; the receipts had increased a couple of hundred pounds a week compared with same period in previous year. Its wooden bridges, on the American plan of Warren and the Pennsylvania Burr bridges, are now being replaced with substantial stone and iron structures, under the direction of Mr. Tighe, the company's engineer. Mr. Tighe undertook a difficult task—one which a Stephenson or a Vignoles could not have designed better, or with more skill and economy—namely, patching up old wooden structures, as well as making new iron and stone ones in their stead, and this has been done without in the least obstructing the traffic.

Push on past the City of Limerick. The Shannon is crossed above Irishtown by means of a simple iron bridge. We pass through very good grazing lands till we get beyond Bunratty Castle, when the aspect changes for the worse, the country as far as Ennis being very poor and stony; this part of Clare is as poor as Connemara, or any part of Galway that I have seen.

Ennis.—Ennis is improving; its streets are better kept than they used to be.

Loughcooter Castle, Lake, and Demesne.—Drive through the fine demesne of the late Lord Gort. Loughcooter has changed hands twice since its noble proprietor left the old roof-tree. Its present possessor is the Hon. Percy Gough, son of Lord Gough, the hero

* From notice in *Athenæum* of "The Life and Labours in Art and Archaeology of George Petrie, LL.D." By William Stokes, M.D., D.C.L. Longmans and Co., London.

of Gugerat. This is a fine residence, perched on a small knoll overhanging the lake, which washes the curbstones of the back entrance. The lake is about five miles wide and eight or nine long; it is very picturesque, and adds much to the grandeur of the scenery. It is backed by the distant mountains towards Loughrea and Eyrecourt. Except in the neighbourhood of Cong, this district presents glimpses of the most enchanting views in Mayo or Galway counties.

Pass through Gort, and observe the effect the absence of its landlord has had upon this once thriving little town. Some fifteen or twenty years ago it looked prosperous and happy; now, how changed for the worse!

Galway.—Galway is progressing, notwithstanding the failure in carrying out the transatlantic postage system, and the withdrawal of the Government subsidy. What a site for a prosperous and happy colony this is! Most advantageously situated at the head of a noble bay, protected by a natural breakwater—the three Isles of Arran,—and having the water power of Loughs Corrib, Mask, and Carra, passing through, unarrested by mills or factories. I question if all the steam power of Lancashire exceeds the water power of neglected and long forgotten Galway. I hope we shall see the fresh dawn of prosperity again shewing itself in the beaming and happy countenances of the Claddagh sons and daughters.

Lough Corrib and Cong.—Went next day by the *Lady Eglinton* steamboat up Lough Corrib to Cong. The first half of the voyage is made through the most intricate navigation imaginable till we arrive at Killibegs. It is at this place, called Knock, that Father Conway proposes that we should bridge the Corrib. It will be a most difficult and expensive work. Nimmo's estimate is much under the mark, as also that of the County Surveyor for Galway. Labour is much more expensive now than it was thirty, or even three years ago; and if Mr. R. will add 30 per cent. to his estimate, I humbly suggest he may come nearer the truth—that is, presuming his design to be anything like what it should be, viz., a plain, substantial, well-built structure, composed of the excellent limestone of the neighbourhood.

From Knock to Cong the lough becomes grand in the extreme. The demesnes of Peterborough and Ballycurrin Castle on our right, with the fine old tower of Ross Abbey peeping out between them.

Ross Abbey.—In a future number of the IRISH BUILDER I may have something to say on this well-preserved, fine old monastic ruin, where repose the dust of several families of distinction in Mayo as well as Galway.

"There is a temple in ruin stands,
Fashioned by long forgotten hands;
Two or three columns, and many a stone—
Marble and granite, with moss o'ergrown."

C. E.

THE EDUCATION OF THE SURVEYOR.

In the course of the past month a paper was read at a meeting of the Institution of Surveyors, by Mr. William Sturge, of Bristol. The subject selected by him was "The Education of the Surveyor"—a topic "much in accordance with the principal object of the institution,—that of promoting the interests and raising the character and position of the profession." The following is extracted from the paper:—

The present state of education for the profession of a surveyor cannot, I think, be considered satisfactory, or adequate to its requirements, especially when we consider the diversity of knowledge required for competent practice in its various branches, the extensive range of subjects it embraces, and the magnitude and importance of the interests committed to its care. In many cases surveyors have had no special education whatever; and, at most, the run of a surveyor's office as a pupil for three or four years, with the addition, in some cases, of a

year or two spent with a practical farmer, has hitherto formed the staple of the surveyor's special education. But valuable, and indeed indispensable, as are these advantages, and successful as they have proved in the example of many eminent members of the profession, I cannot think that they are sufficient to enable the surveyor to keep pace with the advancing knowledge and the more exacting requirements of the present day, but that some special course of study is desirable to qualify him for the multifarious duties which will devolve upon him in the course of an extensive modern practice. I propose in this paper to indicate how it appears to me the special education of the surveyor can be improved, and to consider whether any particular course of study is advisable for the attainment of this end.

The only point I would remark on, in reference to the scholastic education of the youth intended for a surveyor is, that especial pains should be taken to well ground him in mathematics, not so much in the higher branches—though these will in his, as in other cases, be useful as a mental training—as in those which will be of the greatest service in the practice of his future profession. Among these I would mention Euclid, which will not only tend to give him mathematical precision, but to strengthen his reasoning powers; algebra, to enable him to understand those mathematical formulæ in which are expressed the laws of so many branches of science; mensuration, both of superficies and solids; and trigonometry.

As soon as the youth leaves school, whether public or private, his special education for his profession should commence in earnest; and the question at once arises, in what that special education should consist, and what are the means most likely to conduce to the greatest proficiency?

And, first, I would discuss the expediency of completing the education of the youthful surveyor at one of the Universities. I am aware that it is increasingly the practice of professional men to give their sons a University education; and in some, though probably not in many instances, the practice has obtained amongst surveyors. No doubt it has its advantages. The habits, manners, and associations are formed amongst gentlemen, many of them of the landed interest, whose acquaintance may be professionally useful in after-life. The surveyor's son may be a reading man, and may pass with honours the examinations for his degree,—a distinction which will give him a position in after-life. But, on the other hand, the practice has its disadvantages. Several of the most precious years of the young man's life are spent in an education by no means specially adapted to his future profession,—years which he can ill spare, even for University advantages and honours. If he acquire the manners and tastes of gentlemen, he may also acquire the desultory and expensive habits, if not the vices, of too many of his associates; and, instead of reading, he may waste his time in frivolity and dissipation. Even if he avoid these evils, the taste and habits he will form will probably render the drudgery of a surveyor's office peculiarly distasteful to him. On the whole, then, I arrive at the conclusion that the balance is against a University education for the surveyor. I think, however, that the quality of his education should be put to a thorough test.

Let us now suppose the young man, of eighteen or nineteen years of age, about to enter on the task of acquiring a practical knowledge of the profession of a surveyor. I would mention, as a preliminary of more importance than is often attached to it, that of obtaining a good practical knowledge of accounts. This branch of a commercial education is wholly neglected in our classical and mathematical schools; and many boys enter upon their professional studies who scarcely understand an ordinary cash account, much less the mysteries of double entry, or the somewhat complicated bookkeeping of the farm or the estate. Yet a practical knowledge of accounts is as necessary to the

land agent or farmer as to the merchant or tradesman. Without it, the land agent cannot present his annual accounts of a large estate to his employer, with that clear statement and analysis of receipts and expenditure which will exhibit the general result at a glance, whilst it will account for every item in detail. Without this knowledge, too, the land agent must rely entirely upon his accountant; and, honest as it is hoped and believed are the great majority of this class of persons, yet instances of dishonesty not unfrequently occur; and it is obvious that they are far more likely to occur when the accountant knows that his principal is ignorant of accounts, than in cases where he knows that his books will be periodically and strictly audited. This knowledge is also of great use to the land agent, who has to keep the accounts of a home farm and to present a clear and detailed account of receipts and expenditure, and of profit and loss. I believe that a few months spent in an accountant's office is the best mode of acquiring a sufficient knowledge of accounts for these purposes, as well as those habits of neatness in handwriting and figures which we all like to see in our account-books, but which are not often learnt at school. If these objects can be thus obtained, I do not think the time thrown away.

I will now suppose the young surveyor, articulated as a pupil in one of our leading offices in town or country. On the use that he makes of the next few years will mainly depend his chances of success in his profession. He is pretty much his own master: and whether he acquires much knowledge or little will depend mainly upon himself. He will find the partners of the firm too much occupied in business and too much from home to be able to devote to him much personal attention. How, then, is he to acquire the theory and the practice of his profession? As for the theory, the surveyor's library is but scant, and there are no courses of lectures on professional subjects, as there are for the student of law or medicine; yet there are works which may be read with advantage, and as the time for reading after office hours is but limited, the pupil should devote himself to such a course of reading as bears directly upon his profession. Amongst these I may mention treatises on geology, botany, agricultural chemistry, agriculture, estate management, life leases, reversions, &c.

But it is on the practical knowledge to be obtained, by having what is sometimes called the run of the office, that the pupil must in great measure rely; and here I cannot too strongly impress upon him the fact that much will depend upon himself. If he performs the duties assigned to him in a listless, perfunctory manner, as a mere machine, not throwing his mind into his work, he will soon find that his employer will take little interest in him, that he will not communicate his knowledge, and the pupil will at length leave the office without having acquired one-half the knowledge that he might have done; but if, on the other hand, he throws his mind into his work, and makes himself as useful as he possibly can, he will soon find that his employer will take especial interest in him, that he will be glad to have his company on his journeys, when valuable opportunities will arise of acquiring knowledge of the business in hand. The pupil may thus become the confidential assistant, who may be trusted with the conduct of important details, and thus he may early acquire a practical knowledge and a confidence in himself to be obtained in no other way.

(To be continued.)

THE DOWNPATRICK, DUNDRUM AND NEWCASTLE RAILWAY.—We understand that the above line will be ready for opening during the present month. Notwithstanding the heavy nature of the works, and the fact of their embracing every variety usually met in large undertakings, they have been executed with wonderful rapidity—the time occupied being somewhat less than twelve months. The engineer is W. Lewis, Esq., of 43 Dame-street, a gentleman of large experience on Irish railway and other engineering works. The contractors were Messrs. Connor and Olley, Belfast.

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The Irish Builder.

VOL. XI.—No. 219.

The Belfast Municipal Offices Competition.

AR is waging amongst the architects of Belfast, as to the question of awarding the prizes in this competition. The Town Council seem undecided in the matter, inasmuch as the want of a Town-hall has long been felt, and there seems to be a feeling amongst a section of the public that now is the time to have one.

There is a considerable difference between what is usually termed a "Town-hall" and the Corporation Offices proposed to be built by the Belfast Town Council. Perhaps in no town in the kingdom, of the size and importance of Belfast, is such an inconvenient building as is at present in use devoted to the purposes of the Corporation. A piece of land near to the building which has for so many years been used as the Corporation Offices, and abutting on a main thoroughfare, has at length been fixed upon; and some time ago a public competition amongst architects was advertised, in response to which, upwards of thirty sets of plans were sent in. These drawings are now on view in the Council-room of the Corporation.

Although it is not our wish to criticize the designs until after the adjudication has taken place, it is in the interests of those concerned that we advert to the conditions and instructions issued by the Belfast Town Council for the guidance of competitors. More especially will it not be thought inappropriate in us to make allusion to the subject at this juncture; in consideration of the fact that a correspondence is going on in the local newspapers between the competitors, with regard to the merits of their several plans. It will not—or, at any rate, it ought not to—be thought that we would thrust our opinion forward as a kind of arbitrator or umpire in the matter; nevertheless, it cannot be considered out of place to draw the particular attention of those concerned to the specific terms of this competition. At the same time it must not be supposed that we would in any way influence the decision of the Belfast Town Council—if the Council has not already decided—in any other way than by a strict comparison of the conditions issued, with the designs sent in; and in the hope that there may be nothing but fair play. In order, we suppose, to urge the Belfast Town Council to decision in the matter, a member of the Irish Institute of Architects has stepped forward unsolicited, and offered his services to the Council. It is, of course, desirable that thorough knowledge of building, and proper acquaintance with the special requirements of the Belfast Corporation, should assist in coming to a just and a wise decision. Still, it does not appear to us exactly the way in which to secure this end for the Belfast Town Council, or the committee whom they may appoint, to avail themselves of services, how valuable soever they might be, which, if not offered in precipitation, seem slightly out of good taste, and not indeed very respectful to the Belfast Town Council.

In the newspaper discussion which is being carried on, pending the decision on the subject, there seems to be a feeling abroad that an eminent competitor is partly responsible for this attempt to coerce the decision of the Council. Be that as it may, it is quite clear that the design submitted by this competitor, however meritorious it may be, is essentially at variance with the instructions of the Council. We know that it is not always to design precisely in every minutiae according to the instructions of committees, that is perhaps calculated to produce the best result; but to go diametrically opposite to those instructions is *ipso facto* to exclude the design from the competition. If the "disinterested architect" is moved by this spirit to come forward to aid the Belfast Town Council, and say which of the designs are to be chosen, it is not very highly probable that there would be anything approaching satisfaction. Far better indeed leave the Council to decide for itself. Those who issued the instructions are surely the best judges as to whether those instructions are carried out.

In order to see clearly the actual merits of the case, we will take the trouble to go *seriatim* through the instructions issued by the Council, and interpret them to the best of our ability, offering such comments as occur to us.

The instructions are headed, "Borough of Belfast. Municipal Buildings Competition." A plan of the site accompanied the instructions.

"CONDITIONS AND INSTRUCTIONS."

"1. The accompanying plan of the site fixes the minimum width of the streets, but does not define exactly the building lines, nor does the annexed list of accommodation define the exact size or shape of the apartments—some discretion being allowed to the architect in both respects. The principal front must be in Victoria-street."

As to the width of streets, they require no alteration. With respect to the building line, the front of the buildings in Victoria-street should be set back from the street, both for the sake of the privacy of the offices, and also in order to obtain a carriage entrance. The sizes of the various apartments furnished by the Council ought not to be departed from, except from necessity; and none of the apartments should be *less* than particularized.

"2. The drawings shall include only a plan of each floor, with sections and elevations, drawn to the scale of 16 feet to 1 inch; they may be tinted with Indian ink or sepia only, and no perspective drawing shall be submitted. The dimensions of each room to be figured. An outline description, specification, and estimate to accompany the drawings."

There is the point of "Indian ink or sepia only," which must be interpreted liberally, as brown, grey, blue, and even red, are used. Some drawings are not even tinted at all. Let no design be excluded on this ground. Of course, *perspectives* exclude designs.

"3. The recorder's court, the magistrates' courts, the police office, and the fire brigade station, shall form a separate building detached from the main edifice, but immediately adjacent, and remote from Victoria-street."

It can hardly be said that these are a building. All that is intended seems to be that these courts and offices shall be distinct from the corporation offices, which is quite necessary. In order seemingly to comply with "a building," some of the competitors have got the courts connected, and the cells of the the prisoners beneath. The recorder's court has nothing to do with the magistrates' courts; it is only used at somewhat long intervals. The magistrates' courts, on the other hand, are in constant use; they ought, on no account, to be

raised much above the general ground levels. Buildings where there is much traffic are exceedingly inconvenient up flights of steps. In this case there is no necessity for it. And with regard to the prisoners' cells, they should be so arranged that the prisoner charged can be brought out on a level from the cells into the court. Every facility should be given for the administration of justice, and every means planned to save the time of the magistrates, and of the public. What we have here to deal with is not a prison, but *police cells*, for the temporary confinement of those charged with offences till tried by the magistrates, and either sent to jail or dismissed.

"4. The surveyor's department and the rate office shall be on the ground floor, with an entrance in Chichester-street; and none of the offices to which there is a large resort, shall be approached from the principal entrance."

This condition needs no comment.

"5. A basement story, 8 feet in height, and suited for stores, shall be formed under the corporation offices. The floor may be 3 feet below the street level."

There can be but one meaning attached to this. All we remark here is, that the ground floor of the corporation offices should be approached by steps, not out in the street, but further back in the vestibule or entrance hall. To have flights of steps out of doors in this climate is absurd; besides being inconvenient and dangerous.

"6. It is suggested that the cells and fire-brigade station should be placed under the courts, &c., but not below the street level."

With regard to the *cells* being placed under the courts, it renders it necessary to elevate the magistrates' courts up flights of steps, besides having to bring the prisoner up through the floor of the court into the dock, which in the case of magistrates' courts, is not, perhaps, so well.

"7. If possible, the design for the *Corporation Offices* shall admit of future extension, and a site shall be reserved for a police barrack for fifty men."

We italicize the words *Corporation Offices*, as some of the competitors have founded their design on a *Town-hall*. Nothing can be clearer than that the extension refers to the *offices*. A large concert hall, &c., is made to form the proposed extension by some. This is "from the very purpose" of the competition. For our own part, not only are we obliged to say that this is a most unwarrantable liberty to take with the conditions of the competition, thus upsetting them; but, apart from this competition, we do not see the absolute connection between music, banqueting, or lecture halls, and business offices, courts of justice, and prisoners' cells. However, that is an open question. But as to the terms of this competition not including or intending anything of the sort, there cannot be two opinions.

"8. The cost of all the buildings, including all decorations, fixtures, and fittings, excluding furniture only, shall not exceed £16,000. The cost of the Corporation Offices alone shall not exceed £10,000. The cost of the courts shall not exceed £6,000."

A margin ought to be allowed in adjudicating—say the estimate of the competitor should not be £1,000 more, nor £1,000 less.

"9. A premium of £100 shall be awarded to the design which the Council may select as first in order of merit, and premiums of £50 and £25 respectively shall be awarded to the second and third designs, in like manner—provided they comply with these conditions. All the selected designs shall belong to the Council."

We need make no comment on this or the three remaining conditions. Although great complaints are proverbially made at the decisions given in architectural competitions, it seems a simple matter to decide in this

case, as there are so many designs that ignore or contravene the spirit of the conditions,—so many that are not matured, and so few consequently to choose from.

We will add in conclusion, that if well planned, these Municipal Buildings will be of great benefit to the town. It is lamentable to witness the manner in which the working officers of the Town Council are at present inconvenienced for want of office accommodation. To observe the town improvements being effected, and the laudable efforts being made for the wealth of the town, it is almost incredible that the officers of the Corporation are to be found in such a plight. Before banqueting halls, assembly rooms, &c. (of which there are plenty in Belfast) are built, we hope the Corporation will practically carry out this step, which is, undoubtedly, in the right direction.

HOW GRANITE IS AFFECTED BY FIRE.

In the preceding number of the IRISH BUILDER we described the effect produced by fire on the "calp" stone of the Red Cow quarries, and also noticed the injury that water will produce on it if applied while the stone is highly heated. In the present number we will notice granite.

There are few people having any connexion with the building trade in this country but have an idea of the strength and durability of granite, its excellent qualities for the general purposes to which stone is adapted rendering it of almost universal utility. Granite is composed of mica, quartz, and felspar, and its quality is easily discovered by the proportion and arrangement of these; but sometimes traces of other minerals are visible, and influence its density and colour proportionately. Geologists accept it as an igneous rock from the fact of its unstratified condition, and the perfection of its crystals, which seem not to have been worn by friction as others are that are found in sedimentary formations. Another peculiarity that it possesses is the quality of indurating or hardening other bodies with which it comes in contact, and this renders it a superior stone for house-building purposes. It is well known that granite walls, if properly built, need no supplementary linings to make them damp-proof; and that mortar will adhere to them and "set" in a manner similar to that which it does when applied to brick. It must not be thought, however, that this peculiarity arises from either porosity or absorption, for experiments have proved that granite is as dense and impervious to moisture as any stone that we possess, except basalt, and consequently its indurating property must be the result of something else—probably, as far as mortar is concerned, of evaporation caused by the latent heat of the stone, such as all pyrogenous bodies are known to possess. But to be more practical with the subject, we will refer to Mr. Wilkinson's experiments on the different varieties of building stone found in this country—experiments that were conducted with an amount of care and exactness that leave little room for doubt as to the accuracy of their results. The average weight of granite he sets down at 170 lbs. per cube foot, and the quantity of water that it absorbs by immersion about $\frac{1}{4}$ lb. per cube foot. The weight of limestone per cube foot, and the quantity of water that it absorbs, he sets down similarly.

Now, from this it is apparent that it is not by absorption that granite maintains dryness, but rather by some other influence that it exercises; for limestone and it being bulk for bulk of equal weights and equal absorbing tendencies, it might naturally be expected that their damp-resisting qualities would also be equal. Such is not the case, however; for while moisture is unnoticeable on the granite, it appears plentifully on the limestone, or exudes through the plaster in case it is covered, although both stones may be subjected to the same weather influences.

As a fire-resisting stone, granite ranks medium, and, like calp, the inferior qualities are the best adapted to this purpose. In many parts of Ireland where it can be obtained, and where bricks are not available, it is used for lining lime-kilns—a requirement for which it has been found very suitable. It sometimes, too, supplies the place of fire lumps in the backing of kitchen grates and in lining ovens, and in such positions answers very well.

The harder descriptions yield soonest to the influence of fire as they "break up" into more regular portions than the softer kind, which rather undergo a wasting process by disintegration.

It may be well here to observe that, unlike the generality of building stones, granite will hold together firmly, even though it may be severely fractured. The friction of its component parts, supplemented by the toughness of its mica, acts with a degree of power that requires the exertion of considerable force to effect separation, and this—although its cohesive properties are completely destroyed. The general fractures by fire are vertical, and in nearly all cases, parallel to the face, but sometimes they traverse the face in different directions—the change chiefly depending on the quality of the stone and the direction of its mica.

The granite that we noticed in Messrs. Meade's concerns after the fire, was the coping of the wall between their premises and the railway station. The stone is of medium quality. Its projection on that side, in contact with the fire, was carried off in a line with the face of the wall, but other than this it did not exhibit symptoms of yielding that could be called serious, although at times during the fire the flames completely enveloped it.

In Messrs. Barrington's concerns too, in Kings Inns-street, where a terrible fire occurred some years ago, the granite piers and copings withstood the intensity of the heat without sustaining injury beyond the chipping of some projections—and the injury here, as in the former case, we believe to be the result of a reaction caused by the aquatic element coming in contact with the intensely heated stones. The opinion on this matter is strongly supported by the fact, that in the lining of lime-kilns, where granite is submitted to violent heat for considerable periods, it exhibits tolerably fair resisting qualities, never yielding in mass, and but slowly by disintegration. We, therefore, look upon it as a material that may with safety be used in structures intended for fire-proof purposes, and we hope to see architects substituting it in column and arch for "story post" and "bressumer" "architecture" of the day.

ST. JOHN'S CHAPEL, CAMBRIDGE.

THE magnificent Chapel of St. John's College, Cambridge, probably the best and most original work of its accomplished architect, Mr. G. G. Scott, is fast approaching completion. It is hoped that it will be ready for consecration on the Feast of St. John. Port. Latin., the 6th of May, in this year. This chapel will be, beyond all doubt, the second ecclesiastical building in the University, King's College Chapel standing first, for ever secure from all rivalry. The ground-plan is that of Merton Chapel, Oxford,—a cross church, minus the nave, with a pinnacled tower at the intersection, and an organ chamber projecting to the north-east. A flèche was originally intended; but the munificence of the late Mr. Henry Hoare enabled the College to commence the erection of the tower, which has been completed, since his premature decease, from the College funds. The east end forms a five-sided apse. The style is the Decorated of Edward the Third's reign. The tracery of the windows is varied and rich, and the whole, both inside and out, is profusely decorated with elaborate carvings. The foliage round the apse windows is peculiarly lovely. The chapel proper has a coved ceiling of wood, richly decorated with colour and

gilding. It is divided into nineteen bays, which are made to correspond with the nineteen Christian centuries. The bay over the altar contains a representation of Our Lord in Majesty. The remaining eighteen display representative men in religion, science and literature from each century. Those selected for the present century are Wordsworth, Wilberforce and Dean Wood. These, as well as the whole of the internal decorations and the windows, are designed by Messrs. Clayton and Bell. The general effect is of rich but subdued magnificence. The transepts or ante-chapels are vaulted in stone; the lantern, which is very lofty, has a groined ceiling of wood polychromed. There is a great deal of coloured marble used in the interior, in shafts, &c. The old woodwork of the existing chapel is being placed in the eastern part of the new chapel, as far as it will go. The western part is filled with new stall-work, adorned with graceful statuettes. The archaeologist will observe with interest, in the wall of the apse behind the new arcade, an Early English piscina of interesting arches, discovered in the chapel of the old infirmary, which had been long converted into rooms during the progress of the building. Many interesting discoveries of a like nature may be looked for in the demolition of the existing chapel, which was adopted by Bishop Fisher in the sixteenth century, from the original Decorated building of St. John's Hospital. The window-arches are still to be traced where the cement has been removed. We are glad to think that the quick eye of Professor Willis will watch over the work, and that nothing worth recording will pass unnoticed. The destruction of the Master's Lodge has enabled the College to lengthen their hall and construct a second oriel. It was a somewhat bold experiment; but the result is most happy. The proportions of the room are rather improved than deteriorated, and the two oriels side by side have a singular but very picturesque effect. The long gallery of the Master's Lodge has been converted into a combination room. Mr. Scott has constructed a new lodge, in the Tudor style, to the north-west of the chapel. The design is very pleasing. These alterations in the plan of the College have brought to light some things never meant to be seen, especially the north side of the Library, which cries loudly for a string-course and battlements to relieve its bare brick wall. The building to the south of the First Court, so unfortunately classicized in the last century, must also be brought back again into harmony with the buildings about it. We may safely leave these measures to the taste and good feeling so largely manifested by the existing members of the College.—*Athenæum*.

BOOKS RECEIVED.

THE *Journal of the Historical and Archaeological Association of Ireland*. Dublin: M'Glashan and Gill.—We have received the third part of the new series of this very interesting and instructive journal. The paper by Mr. G. H. Kinahan, M.R.I.A., on "Cyclopean Churches in the vicinity of Loughs Corrib, Mask, and Carra," is continued in this part, and (together with some of the other papers) is illustrated by several beautiful lithographs, drawn by the late G. V. Du Noyer. Mr. R. R. Brash's paper, on "The Seskinan Ogham Inscriptions, County of Waterford," will be carefully perused by all interested in the antiquities of our country. We shall, in a future number, extract for the benefit of those amongst our readers who may not have an opportunity of seeing the "journal," one or more of the valuable contributions appearing in its pages. We must, in conclusion, congratulate the association and its courteous honorary secretary on the very marked improvement in the present series. Part 3 comprises sixty pages of letterpress, and nine well-executed lithographs, besides several wood engravings.

EXHIBITION OF PAINTINGS AT THE BELFAST ART UNION.

In continuing our notice* of this collection of pictures, we must express our regret that other engagements have prevented our devoting the time to it that it really deserves. It is announced that the exhibition closes at the end of the present month. Those who would secure the chance of possessing some of the gems of art contained in this collection, had better at once apply for shares. The shares are five shillings each.

No. 6 and No. 13. These are marine views by J. J. Wilson. The painting is masterly. Nothing could be more natural than the color and play of the waves. There is also a breeziness and a refreshing atmosphere about these pictures, that makes the spectator look and return and look again. It would be very difficult to match these views.

No. 14. "Rehearsing Private Theatricals—A serious Play" (C. A. Du Val). This picture affords scope for conjecture. A handsome youth seated, is rehearsing his part in the dialogue with a young lady, whose back is turned to the spectator, but with whom the amateur actor has evidently fallen in love. Another youth and a maiden, to whom are allotted subordinate parts, are looking on with mingled expressions of amusement and vexation at the scene, seemingly impatient that the rehearsal does not proceed, because of this peculiar obstacle. The figures are well painted, and the facial expression is very good. The accessories and the view out of the window have rather a muddy look.

No. 16. "Evening near the Lledr Valley, North Wales" (A. De Breanski). This is a rich piece of color and composition. There is water with cattle in the foreground, and mountains in the middle distance and background. Harmony of colour and grouping distinguish this piece, as is also true of No. 33, "Morning," a companion picture, by the same artist. The mountains have a solid and massive effect, quite grand. The reflections in the lake are exquisite, while the gentle ripple of the water in the foreground is delicious.

No. 35. "Our Village, Ockham, Surrey." This is a carefully-painted picture, and withal, a most sweet composition. The figures are well introduced. The stream running from under the arch of the mill is well given, and the water pouring over a stone ledge in the foreground could not be more truthful and natural. There is an air of comfort and peace about this scene where one loves to linger.

No. 43. "Evening near Dolgelly, North Wales" (Alfred W. Williams). In our former notice we spoke very favorably of this artist's "Early Spring." Not less truthful is this evening piece. There is not much in the composition, except a group of trees in the middle distance, and the tops of some mountains in the background. The effect, however, is excellent. The sun has set, and the upland which slopes in the opposite direction is left in shade. The lingering light, however, falls with tender glow on the distant hills. There is no attempt at adding to the tone of natural color, but the influence is that of truth, and the poetry of the hour.

No. 77. "Loch Katrine." This is a well-chosen and a well-painted subject. The foreground is especially good. The usual hackneyed views of this loch become somewhat tame in comparison. The artist has selected a point where, in his foreground, he has a road crossing a burn which tumbles down to the lake, losing itself in the distance before it reaches the shore, amongst the trees that grow with luxuriance on its banks. The distant loch, with a steamboat, is well rendered; the atmosphere and slight haziness being very lovely.

No. 86. "Loch Sloy, Argyleshire" (J. Adam). This is a masterly landscape. The burst of sunlight on the mountain, and the dazzling effect on the water, are really grand, and stamp this painting with great merit.

All parts here seem treated with equal fidelity. The view is inexpressibly pleasing.

No. 91. "Spring at Burnham Beeches" (W. Laker). Although this effort looks somewhat laboured, it is very truthful and very pleasing.

No. 105. "Moel Hebog, North Wales" (G. Hastings). Very natural, but very timid.

No. 115. "Evening—North Wales" (J. C. Salmon). Rather gorgeous, but very gaudy coloring, and to our eye not over natural.

No. 122. "Sunset on the Frith of Forth" (R. Saunderson). This can hardly be called a finished picture. As a sketch, it is highly natural, fresh and powerful.

No. 124. "Listening on the Sly" (P. Hoyoll). This is a well-executed and rather striking painting. It represents a little girl sitting by the parlor fire, engaged in reading the *Illustrated London News*, which she, however, only holds up as a make-believe, hiding her face from her elders who are evidently in the room, though not seen by the spectator, to whom, however, her saucy face is quite visible. The sly, roguish expression, which, without any other explanation, tells us she is greedily drinking in with her ears some conversation going on which is not intended for her, and which those engaged in evidently think she is not noticing, is intensely rich. We have also a word to say in praise of the capital manner in which the snug parlor is painted; and the marvellous way in which the light of the fire is made to fall upon the face of the child and the edges of the furniture, is very admirable.

No. 126. "Fishing Boats—Early Morn" (C. Weber). We have no objection to this tone of color which may represent "Early Morn," nor have we any fault to find with the grouping of the fleet of fishing boats. When we come to the water, however, "There is the weight that pulls us down." The picture is at present a petrification. The water is as solid as rock, and look at it how we will, there is no motion in the vessels, and no liquidity in the water.

No. 134. "The Love Letter" (C. Grieron). Executed in a masterly style. A beautiful girl with a black lace veil over her face, holds in her hand a letter which she is taking to the post. This is a very critical thing for an artist to attempt,—namely, when he has painted a good face, to have the courage to throw a veil over it, especially a black veil. It requires a true eye and a skilled hand. Here we have both, and there is not the least appearance of wavering or unsteadiness of painting out, or alteration of any sort. The thing has been done once, and done well. The girl's beauty is not hid, and the picture is not marred. The veil has been rapidly painted, but well painted, and every lady will pronounce it to be lace.

No. 147. "Hudibras and Ralpho in the Stocks" (J. Pettie, A.R.A.). A humorous scene from Butler's poem of Hudibras. The expressions of the two faces are very mirth-provoking. The serious lank face of "Afflicted Ralpho," and the bloated rubicund face of Hudibras scratching his bald head, while carrots, cabbages, and rotten eggs are being thrown at them, presents a picture which is worthy of the artist, and which, indeed, is here most admirably rendered. The humorous conception of the poet has been enhanced by the humorous representation of the artist.

149. "After Sunset" (C. Smith). Very effective, natural, and sweet.

152. "The Wreck" (Alfred W. Williams). A noble vessel dismasted, and riding, or rather drifting like a log on the awful waves, a pitiable sight to see. The rush of waters, the endless surging of the billow, the sea running mountains high, could not be more forcibly rendered. The endless roll of the storm clouds, and the evident hopelessness of anything bearing up in face of the hurricane that is blowing, produce a deep impression on the mind from a study of this picture, and lead us to exclaim with Longfellow—

"God save us all from a death like this,
On the reef of Norman's Woe."

No. 166. "Lano at Tynemouth, North Devon" (S. H. Baker). Well painted foliage, sunny effect, and altogether a meritorious production.

No. 168. "On the Ilugwy, from Pont-y-pair, North Wales" (W. Cubby). An excellent landscape. The water running amongst the rocks is very good. There is here no attempt to shirk the tremulous water at the foot of the fall in the foreground, so difficult and bewildering to the artist. If anything, it is painted with extra fidelity.

No. 170. "Pont-y-Lledr, North Wales" (Sidney R. Percy). An exquisitely delicate painting, but rather too dark in tone. When an artist is determined to introduce, and to manipulate the detail so well done as this, he often gets his picture too dark in tone. A painting that represents sunshine, should, if possible, not be below the tone of the light.

Room B.—No. 205. "Cornfield, Mumbles, near Swansea, South Wales" (Heywood Hardy). A most pleasing landscape of coast-scenery, with a rich ripe cornfield in the foreground. We complain a little of the want of light in the tone of this picture, but perhaps that may be owing to some extent to the room where it is hung, which is wretchedly lighted, and exhibits the pictures in it at a miserable disadvantage.

No. 243. "London, from Hungerford Bridge" (Anderson). A large and noble picture, solidly painted. The perspective is good, and the point of view well chosen.

No. 244. "The Fire of London" (C. M. Ward, R.A.). Appended to the title of this picture in the catalogue, is the following notice in quotation marks:—

"In this grand historical work, the artist has represented the scene that took place on that momentous occasion. The improvised tent, with its wealthy occupants, and the lost child restored by a faithful Moor—the thief eyeing the costly plate hastily removed—the bivouac of the strolling players—the fanaticism of Solomon Eagle—the distant fire raging in all its fury—and many other incidents, are each and all depicted with such graphic vigour, that the mind almost realizes the great drama. The picture is a triumph of the limner's art."

We dissent from this opinion. The picture is by no means "a triumph of the limner's art;" ("limner" is a vile word) but, on the other hand, would be most puzzling to the spectator if he were not told its meaning, and even with that light and the illumination thrown upon it by the above note, he can but very faintly see what "took place on that momentous occasion;" more especially is he unable to "realize the great drama." The painting is somewhat in the style of "Hogarth's perspective," as far as perspective is concerned. To paint the fanatical Solomon (who is represented standing on a hill in the middle distance), as large as the figures in the foreground, and raising his arm literally to the clouds, is certainly a rather fanatical perspective.

No. 250. "Old Houses, Watergate-street, Chester" (H. P. Rothead). It is not often we find oil pictures giving with such minutiae and accuracy the architectural details of buildings. Here we have a most interesting relic of the past. This picture will prove a most truthful, and valuable memento; the more so, that it is executed in the best taste, and with the utmost skill.

No. 276. "Evening" (C. Smith). This is a small cabinet painting. It deserves great praise.

No. 289. "Morning," by the same artist. Executed with the same skill.

We must reserve until next issue our notice of the water-colors.

Lord Campbell, in a speech the other day, said—"Next to Guy Fawkes, the late Sir Charles Barry had been the most sinister and inexorable enemy to Parliament. He consigned the two Houses to structures where, as they could not hear what was going on, they had but one alternative—to vanish. The House of Commons, by a false roof, had defeated the manœuvre. The House of Lords had died away under its influence." Architects who are erecting great works for posterity should take warning from this observation.

* See IRISH BUILDER for December 15th, 1868.

HISTORICAL AND ARCHÆOLOGICAL ASSOCIATION OF IRELAND.

THE annual general meeting was held on Wednesday, 13th ult., at the Association's new apartments, Butler House, Kilkenny, and the occasion was one of more than usual interest, as being the twentieth anniversary of the founding of the Association under its original title of "The Kilkenny Archæological Society."

The Rev. Philip Moore, P.P., having been called to the chair, the Rev. James Graves, hon. sec., read the report for 1868, from which we take the following extracts:—

"The report of your committee for the year 1868 marks an important era in the career of this Association. Twenty years have elapsed since it struggled into existence in the guise of a mere local society, whilst now it can proudly point to its ample roll of members gathered from every county in Ireland, and claim to be national in its operations as well as its aspirations. Twenty years have since then passed away—a third part of the ordinary life of man—but not without some fruit being garnered for posterity. On the shelves of many a public and private library in the British Islands, on the Continent, in the United States of America, and even in distant Australasia, may be seen a goodly rank of volumes with the name of the Association blazoned on them; whilst, that they do not represent a mere congeries of useless print and paper, is testified by the equally gratifying fact, that their money value steadily advances—a perfect set fetching readily a sum far above the cost price paid as subscriptions by each original member.

"Twenty years tries the constitution of most bodies, and, of course, it has not been without its effect on the roll of our members; yet out of a list of 156 there remains inscribed thereon a goodly number of those true friends who stood by the cradle of the Society, and helped it into vigorous existence.

"Your committee report with pleasure the addition of 56 names to the roll during the past year.

"Your committee congratulate the members on their being enabled to hold their present meeting in new and more commodious apartments, and they trust that ere long the museum of the Association will be, through the exertions of the honorary curator, more generally known, now that it can be better displayed than was possible in the rooms it hitherto occupied.

"The sixth volume, second series, of the Journal (for 1867) is far advanced towards completion, and the three first numbers for 1868, being the commencement of Vol. I., third series, are in the hands of the members. The fourth number is at press, and will shortly be issued. Your committee are glad to point to an improvement in the paper and typography of the series now commenced, and trust that the matter will not be found less interesting than formerly. It is proposed, if funds are supplied by the members, to illustrate the Journal yet more fully than formerly.

"The new organization of the Association has been completed, honorary secretaries having been elected for each province, and your committee rejoice to be able to point to the increase of the members during the past year, as a proof of the wisdom of the change recommended in the last report, and carried out by the unanimous voice of the annual general meeting of January, 1868.

"Hitherto it has been the pleasant task of your committee to speak of the prosperity of the Association, and to point with good hope to its future prospects. All seemed bright and promising up to the close of the old year; but an event has happened so close to the termination of the period for which they are bound to give an account, that they feel compelled to notice it. Your committee need hardly say that they allude to the sudden death of George Victor Du Noyer, Esq., senior geologist of the Irish Geological Survey, a member of the committee, hon. provincial secretary for Ulster, and one of the most accomplished of our Irish archæologists. The loss which your Association has suffered by the demise of Mr. Du Noyer, cannot be estimated. Trained as an observer and archæologist under Portlock and Larcom in that admirable school, the Ordnance Survey of Ireland, he was one of the noble band, headed by Petrie, O'Donovan, and Curry, who have made Irish Archæology a science worthy the study of earnest men, and rescued it from the domain of empiricism and conceited ignorance; a pupil of that accomplished artist, Petrie, he equalled his master in truth of touch and the minute accuracy with which he could render the details of a subject, no matter how difficult; whilst the true 'feeling' of the artist pervaded every production of his pencil. His peculiar qualifications early attracted the notice of the directors of the Geological Survey of Ireland. The labours of Mr. Du Noyer in that department of science remain a lasting monument to his fame. He was engaged in the revision of the Survey in the North of Ireland, having risen to the highest post save one in his de-

partment, when prematurely removed in the full enjoyment of his powers both bodily and mental, and in the midst of his labours. Of him it may be truly said that he died in harness. His accomplished pen has left its trace deep and wide in the volumes of our 'Journal,' and his ready pencil was ever at command not only to illustrate his own valuable papers, but also those of his brother archæologists. His noble and unselfish nature ever sought opportunities to place at the service of others the rich stores of his note-book and portfolios, and above all, to the editor of your 'Journal' his death is as the loss of a right hand."

The treasurer's accounts for the past year shows a balance in the Association's favour.

The former committee and officers of the Association were re-elected for 1869, with the exception of the appointing of Charles D. Purdon, Esq., M.D., Belfast, to the place in the committee rendered vacant by the death of Mr. Du Noyer, as well as to the honorary provincial secretaryship for Ulster, which had also been held by that much-lamented gentleman.

Fifteen new members were elected, as follows:—Lord Francis Conyngham; the Hon. Mrs. Caulfield; the Rev. Thos. Walsh, P.P.; the Rev. John Lyons, C.C.; Capt. Swanne; David Mahony, Esq.; Chas. H. Todd, Esq., LL.D.; Rev. Denis M'Sweeney, P.P.; John Mackey, Esq.; R. Young, Esq., C.E.; Henry Staunton, Esq., J.P.; Dr. Yelverton Bosquet, F.O.S.L.; Sheppard F. McCormack, Esq.; Mr. James Bain; John Moore, Esq.

ST. FRANCIS' ABBEY AND CLONMACNOISE.

Mr. Graves reported that the work of propping the tower of St. Francis' Abbey by metal pillars, according to the plan already reported as having been fixed on by the committee, had been carried out; but the making good of the haunch of the tower yet remained to be done when the weather would be more suitable for such an operation, provided funds sufficient could be procured. The expenditure already incurred was about £34; the balance in hands of subscriptions received towards meeting that work (which would involve an expense of some £25 more) was but between £7 and £8. Mr. Hayes, the proprietor, had offered to allow the committee to open up the windows and sedilia of the choir, and most gladly would they accept the offer. They had to thank Mr. Smithwick for much valuable aid, in addition to his subscription of £10, to the work already done, and they were indebted in the highest degree to Mr. Middleton, for acting most efficiently as engineer and director of the works. They hoped to avail themselves further of Mr. Middleton's services in that way in the works yet remaining to be done. He had much pleasure in also reporting that the reparations of the cap of the lesser Round Tower of Clonmacnoise had been completed in the most satisfactory manner, the special subscriptions raised in that case having sufficed to meet the expenditure.

BURIAL BOARDS.

Mr. Prim reported that the resolution passed at the last meeting of the Association, for writing to the Poor Law Commissioners on the subject of communicating with all beards of guardians acting as burial boards, for the prevention of injury to ancient monuments in the re-enclosing old churchyards, had been carried out by the hon. secretaries, and a satisfactory reply had been received from the commissioners.

PRESENTATIONS.

A number of publications issued by kindred societies, and presented to the library, were laid before the meeting.

Mr. Graves, on the part of the Marquis of Ormonde, presented some hazel nuts, which had been dug up from a depth of 20 feet in the bog of Poulacappel, on his lordship's property, near Garryricken. They were found in connexion with the bones of the extinct gigantic deer (*Cervus Megaceros Hibernicus*). Except that they were blackened from lying so long in the bog mould, the nuts were as fresh-looking as if they grew during the last season, and on being opened, the kernels were found to be quite sound and perfect.

The chairman presented a silver groat of Edward IV., coined at the Waterford mint.

W. H. Cooper, Esq., J.P., presented a "St. Patrick Halfpenny," which did not present the usual feature of the crown on the side, representing David playing on the harp, being stamped on a piece of brass inserted in the copper. The whole of this coin was copper.

Mr. Martin Grady presented a silver penny of Edward III., coined in London, which had been found in tilling a field at Danesfort.

HISTORICAL PORTRAITS.

The chairman said he had for some time amused himself by forming a collection of engravings, portraits of remarkable Irishmen, or men historically connected more or less with Ireland. Mr. Graves had discovered his weakness on this point, and had suggested that he should exhibit his "portrait gallery" to the members of the Association, and he had responded to that suggestion by bringing in a portion of his collection on the present occasion. The rev. gentleman then proceeded to lay the portraits before the meeting, the greatest possible interest being excited by their exhibition. Amongst some of the oldest worthies, he had the famous "old Countess of Desmond;" Sir Walter Raleigh, the supposed introducer of the potato; Boyle, first Earl of Cork; Sir John Perrot; the Earl of Stafford, and a striking portrait of Owen Roe O'Neil. Of the stormy Cromwellian period, "Old Noll" himself was a speaking picture. His son Henry, and son-in-law Ireton, were there, and "Black Axtel," Cromwell's Governor of Kilkenny. "Praise-God-Barebones" (Mr. Moore observed) could not be considered as much connected with Ireland, but Speaker Lenthall was at least more so, as to him Oliver's despatches from this country were addressed. Fleetwood was another. The Duke of Ormonde, Bishop Roth, Murrough, Earl of Inchiquin, and Ulic, Lord Clanricard, Sir Phelim O'Neil, and several other Irishmen who played various parts in the struggles, were present; but the collection was incomplete without Mountgarrett, the Chief of the Kilkenny Confederation, and he had been unable yet to discover if any such portrait was in existence. Advancing onward in the stream of time, he showed portraits of several of those who were at the Boyne and Aughrim; and, as he observed, he had the men who "fought on either side of the water." Sarsfield and de Ginkel, the Duke of Berwick and Duke Schomberg, and Rene de Troually, Count de Tesse, second in command under St. Ruth—he was sorry that the result of his inquiries tended to show that no portrait of St. Ruth himself was known to be in existence.—Talish, Earl of Galway; Major-Gen. Thomas Maxwell; Walker, and some of the other defenders of Derry; Richard Talbot, Duke of Tyrconnel; the second Duke of Ormonde, the Earl of Clarendon, and many more of that interesting period. Distinguished men of Irish descent in foreign military service were also represented in the collection by Jean Sigismund, Comte de Moguire, the Count Maurice de Laci, and others; and amongst numerous other portraits—too many to particularize—was a very striking one of the notorious desperado, Colonel Blood.

The members present expressed their warmest acknowledgments to the chairman for the large amount of pleasure communicated to them, by being enabled to examine so many specimens of his truly interesting and most valuable historical portrait collection.

ANCIENT GOLD AND OTHER ORNAMENTS.

Mr. Robert Day, jun., Cork, exhibited a magnificent collection of ancient gold and other ornaments, forming the gems of his own private collection. The first object which he laid before the members was a fine gold fibula, of penannular formation, with cup-shaped expansions at the ends. Respecting this, he observed:—"This gold fibula came into my possession on the 9th instant; it was turned up by the plough in a field at Ballymacolter, near Cloyne, Co. Cork—a place in which, I have been informed, many other gold ornaments have been got. The finder supposed it to be of brass, and brought it home,

where he broke it in the centre, and attempted to form a thread on one end, in order to screw it into the door, as a peg on which to hang his hat! Before accomplishing this, however, it was seen by Mr. D. Cronin, who procured it for an ounce of tobacco. He brought it into Cork, where it was purchased by a jeweller, from whom I obtained it. I have since corresponded with Mr. Cronin, who corroborated this story, and who most honorably gave the astonished finder £4 per oz.—viz., £6 for it. It has been so well repaired, that its original form has not been altered. It somewhat resembles that shown in fig. 586, p. 53, in the catalogue of the Royal Irish Academy. It differs from the generality of these ornaments in not being cylindrical, but of somewhat quadrangular form. The hoop is very slender, swelling slightly in the centre, and the two terminal cups are of wine-glass form, measuring 1 inch across the rims, and $4\frac{1}{2}$ inches in diameter; it weighs 1 oz. 9 dwts. 5 grs." Mr. Day then exhibited, as illustrating the ornament in question, an antique Irish bronze fibula, and an Indian silver one, as also a specimen of the African bronze ring-money, all of which resembled it very much in form. It was remarked that the Indian silver brooch or armlet, whichever it was, was ornamented with a very Celtic-like pattern. Mr. Day next exhibited a case of extremely curious gold articles, respecting which he observed:—"The gold ornaments which I have now the pleasure of laying before you, were purchased by me in Cork last October. Soon after they came into my possession it was said they were not Irish, and I heard from the same source that similar ornaments from Africa had been in the possession of a gentleman living in the west of the county of Cork. On my corresponding with him, and sending him accurate drawings of them, he replied that he had purchased some African gold, but '*it bore no resemblance to the sketch which I had sent him.*' He has thus set at rest the story of their African origin. I have no reason to doubt the statement made by the firm who had them from the finder, which was that they were dug up near Youghal, in the County Cork; and the spiral and zig-zag ornament which occurs on them strengthens my conviction that they are undoubtedly Irish, of the highest rarity, and probably unique. They may be described as a series of gold links of twisted wire-work, varying in form and size—some oblong, others oval, cylindrical and circular—forming a chain or collar; also a finger ring of twisted gold wire, with an interlaced ornament; four trefoil pendant ornaments, a bugle-shaped pendant; two other hollow barrel-shaped pendants, and a massive gold thumb-ring of the same workmanship, surrounded by a figure in twisted gold wire, resembling a cock. This appears to have been a ring of state, as it could not, from its peculiar form, be worn except on particular occasions. The chain was also probably a collar of state, and the rude representation of the cock surrounding the ring may have been the device or crest of the chieftain to whom they belonged. There are six separate spirals on the ring, three at each side of the cock; and these are surrounded by a fillet of twisted gold wire. The weight of the whole is 4 oz. 1 dwt. 4 grs., and they are of the red gold, which is so often mentioned in our early annals. To illustrate these I have brought two ancient Irish glass ornaments, from my collection, on both of which is a similar spiral ornament. In the Museum of Trinity College is a splendid gold mammillary fibula, figured by Sir William Wilde in his Catalogue of the Antiquities of Gold in the Royal Irish Academy, page 60; the outer surface of the bell-shaped cups of this fibula is decorated with the same spiral; and at page 37 are two conical beads resembling in form some of those in this chain. In Ackerman's Pagan Saxondom, pt. I., fig. 3, some conical links of a gold chain are figured, which bear a strong resemblance to some of these; and in the sepulchral chambers of New Grange, &c., we find the spiral ornament chiselled in the stone. We also find there and elsewhere the penannular ring cut in the living rock, so that

I have often thought that the incomplete circle and spiral so placed are the same symbols equally represented in the stone and in the metal."

Mr. Graves and other members said they had no doubt of these ornaments being Irish, although nothing exactly similar in shape had hitherto been found. They agreed with Mr. Day's view as to the ornamentation being decidedly of the old Celtic character.

Mr. Day next exhibited a case of very beautiful ancient glass ornaments in a good state of preservation. He said the central glass ornament in this case was found in the spring of 1864, near Newtownlimavady, Co. Derry, by a labourer, who turned it up on his spade. It is of oblong form, and is surrounded with a raised blue and white straited beading, and has a similarly formed central scroll ornament, which is studded with twelve drops of light vitreous paste or enamel; it is pierced with two holes, through which a double cord may have passed. Encircling this in the case, is an armlet of pale green glass, which was found in unreclaimed ground near Ballymena, County Antrim, in July, 1862. Our National Museum, in Dawson-street, Dublin, contains the portion of a similar armlet; this is probably the only entire specimen known. Above this, in the centre, is an armlet of dark blue color, with 5 raised enamelled ornaments of yellow, blue, and white; these, it is said, represented the five wounds of our Saviour, and they may have done so in later times, but I am inclined to think our ancient glass ornaments are of an earlier date than the introduction of Christianity into this country, and were worn simply as ornaments. Another stone bead, with five circular pieces of light green glass set in the edge, which may have served a like use, and another of cylindrical form, were got with it, and also a leaden bulla of Pope Alexander IV. They were said to have been found in the ruins of Tristernagh, a Priory of Canons Regular, in the parish of Ballinacarrig, County Westmeath. This Priory owes its foundation to Geoffrey de Constantine, at or soon after the time of Henry II., and as Pope Alexander IV. occupied the Papal chair from A.D. 1254 to 1261, it is not unreasonable to suppose that this may have been the identical bulla which was attached to the original charter of the priory. On the same line with the armlet at the right hand side of the case, is another with the projections also of blue and yellow colour; and at the left-hand corner is an ornament which I believe to be unique. It is made of blue and white glass, set with six large pieces of light yellow vitreous paste; it is open at three sides, and contains another bead of similar colour inside. Beneath the armlet are three other glass ornaments of rare forms, one of which, of blue glass, is enriched with gold-colour enamel settings, and differs only in size, it being twice as large as a bead found at Timahoe, Queen's County, figured in the Transactions of this Association, Vol. II., N.S., p. 8, preserved in your Kilkenny Museum.

The meeting having inspected these very interesting objects, Mr. Day then submitted to them a number of bronze pins and fibulae, stone and bronze celts, bronze spear-heads and sword-blades of unusual types, and amongst other curious objects, a small bronze level, set with crystal ornaments, exactly similar to the ornament in Freemasonry usually appended to the Master's collar.

A vote of thanks to Mr. Day for coming so far to afford them so great a treat, was passed unanimously.

(To be continued.)

THE ART UNION OF BELFAST.

GREAT exertions have for several years (says the *Northern Whig*) been made to have an annual Winter Exhibition of Works of Art in connexion with this Union. It is not a thing that can be easily established on a basis that would warrant expectations of permanency. There are great expense and trouble connected with it, and to a considerable extent the public have to be educated to a liking for

and appreciation of it. A fair amount of success has hitherto attended it; and this success, we are glad to know, has been increasing rather than diminishing. Yet a good deal more is required before the Art Union can be said to be in that settled condition in which it may be counted upon as one of the annual exhibitions which the Belfast people may certainly look forward to enjoying. It is a thing that everybody is interested in; for this year the admirable Exhibitions of Paintings was opened on many Saturday evenings at reduced rates for the working classes, and large numbers flocked to see it. It is, therefore, of considerable importance to the town that everything that can be done to make each year's exhibition more and more successful. We have already given detailed notices of the pictures in the present exhibition. It is not certainly one of uniform excellence; but it is one such as will not be often found in towns as large as Belfast. That portion of the public which takes an interest, however small, in these "things of beauty," have gone and examined for themselves; and now the time is drawing near when the lucky prize-holders will carry off to their homes such pictures as suit their varying fancies and tastes. No doubt, every one would like to be amongst the lucky drawers, but if this cannot exactly be, every one has at least his chance; and the greater the number of subscribers, the greater the number of prizes to be distributed. Even those who do not get a picture or engraving ought to have considerable satisfaction in reflecting that he is helping to the success of an institution which it is good to have in the town, and the want of which most people would regret. Besides, they may be successful next year—provided, that is, the encouragement this year is sufficient to warrant a continuance of the exhibition. Those, therefore, who take this view of the matter—and they ought to be very numerous—should recollect that the drawing for prizes takes place in the Ulster Hall on Monday evening next, and that tickets are still available. The exhibition itself will close the week after. We hope to see many other exhibitions of the kind in Belfast, but then, to be sure of this, it requires a well-filled subscription list.

[The want of a suitable picture-gallery in Belfast is very much felt. Both in the interests of the town and of the artistic profession, such a hall should be established. It does, indeed, seem a strange thing, that while there are so many halls for lecture and debate, the art which brings together all classes is without a *locus standi* in the town.—Ed. I. B.]

THE STATUE OF THOMAS DAVIS IN MOUNT JEROME CEMETERY.

THE *Universal News*, a London paper, has drawn attention to the dangerous state of this fine work of art, arising from a defect in the marble being operated on injuriously by the action of the weather. We made an examination of the statue, and we found that the statement is but too true. On the left shoulder there appears a crystallized cavity in the marble, which apparently extended through the portion of the block cut away in forming the neck, but which was, from the direction of its course, again touched upon at the formation of the left ear. From this place its course is slightly oblique, and can be traced in the nature of a "smooth joint" for about 10 inches, part of which is slightly open. There can be no question of doubt but that the alternate action of moisture and frost will seriously affect it, and we would strongly recommend some steps to be taken to protect a work of art holding such high rank among our national monuments.

MECHANICAL ARTS.

IRONFOUNDING.

(Continued from page 18.)

THE great bulk of cast iron work is moulded in what is termed 'green sand,' that is, loose sand, in much the same condition as it comes out of its native bed, but slightly moistened with water, and thoroughly mixed with about one-twelfth of its bulk of coal dust. It is then passed through a wire sieve. The sand thus prepared is also called 'facing sand,' and is always put to the face of the mould next the hot metal, and when it has once served for this purpose it is never afterwards allowed to touch the molten iron, but is used for filling in at the back and supporting the facing sand. The sand is supported round the form of the mould by numerous ribs running through it about 6 inches apart. These ribs are supported in their position by a cast iron frame or box to which their ends are attached. The ribs and box are generally cast in one piece.

To mould in green sand, an exact pattern of the figure or object to be cast, must be prepared. Patterns are generally made of either wood or metal. Metal patterns, if not too heavy, are preferable to wooden ones, as they do not swell, shrink, or warp. The pattern must taper slightly in places which have to be drawn any depth out of the sand, and much of the success and ease of moulding depends on the care and skill with which the patterns have been prepared.

The sand must completely enclose the pattern, and if it be of a plain shape it may be sufficient to sever the mould into two parts and thus withdraw the pattern; but should it be of a complex form, one intersection of the mould may not be sufficient to release the pattern, so that two or more intersections may be necessary. The severance of the sand along the intersected surface is effected by a thin stratum of what is known as 'parting sand,' which is generally fine sea sand thoroughly dried, though sometimes the sand which adheres to the castings, when taken out of the mould, is used for this purpose.

One intersection of the mould is effected in some cases by using only one box, the other half of the mould being supported by the sand in the floor of the foundry. The sand of the floor is first loosened and levelled, or otherwise prepared to suit the shape of the pattern, a layer of facing sand is then spread over it from a sieve. The pattern is lightly hammered down until its greatest horizontal section runs level with the surface of the floor; the sand is then rammed close up against its vertical edges or sides. After as much of the surface of the floor surrounding the pattern is levelled and smoothed as will be overlaid with the box, a thin coating of parting sand is scattered on this smooth surface, and the pattern; the box is then laid on, and another layer of facing sand spread over the pattern through the ribs of the box. Common sand from the floor is now filled in so as to completely fill the spaces between the ribs of the box, and after this is rammed hard the box is taken off gently, the sand in it separating easily and distinctly from the floor, owing to the interposition of the parting sand. The face of the mould next the pattern is damped with water from a sponge or swab; the pattern is lifted out, and any deficiency of the mould is remedied. The runner and gates which convey the metal to the mould are then formed, and the face of the mould dusted over with wood charcoal and polished with a fine trowel. The box is then replaced on the floor in its former position, the mould being now complete.

When the box is replaced on the floor, great care is taken that it occupies the exact position it did when the pattern was in the sand; otherwise the casting will be distorted. The correct replacement of the box is ensured by driving stakes into the floor alongside of lugs on the box, when first placed on the floor, so that when it is replaced these lugs are slid down alongside the stakes into their former position.

In the annexed figures, fig. 1 represents the moulding box; fig. 2 is a section of the

Fig. 1.

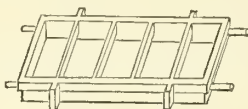


Fig. 2.

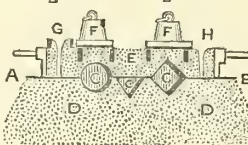
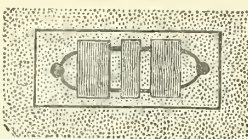
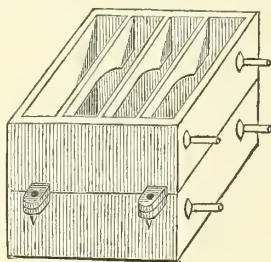


Fig. 3.



box, moulds, and part of the floor; *a b* is the surface of the floor on which the parting sand is spread, *c c c* are the moulds, *d d* the sand in the floor, *e* the sand in the box, *f* and *f* weights which are put on the box to keep it from being floated with the molten metal, *g* is the head into which the metal is poured, *h* is an orifice sometimes left for the escape of the air; fig. 3 is a plan of the floor with the box off after the patterns are withdrawn. From whatever cause, if the sand requires to be well rammed against the pattern from both sides, then two boxes must be used. The annexed figure represents a pair of these



boxes, and shows the way in which such boxes are generally joined together, by lugs and pins, so as to ensure the same relative position to each other whenever united. Of course, these boxes are made of various shapes, to suit the form of the mould to be cast. It may happen that the pattern is of so complex a form as that it cannot be removed from the sand by using two boxes without injuring the mould. In such cases three or more boxes must be used and united together in the same way as represented in the figures given above.

THE ROYAL DUBLIN SOCIETY'S SCHOOL OF ART.

ANNUAL DISTRIBUTION OF PRIZES.

THE annual distribution of prizes awarded to pupils of the Royal Dublin Society's School of Art, by his Excellency the Lord Lieutenant, as president of the institution, took place on Thursday evening, in the Lecture Theatre of the Society. The viceregal party were received by the officers of the Society at the entrance to the building, and conducted to the theatre.

Mr. G. W. Mannsell said it became his duty to open the proceedings which his Excellency had been kind enough to preside over that evening. Their first duty, on his Excellency's first appearance as president of their time-honoured institution, was to bid him the hearty welcome which the Queen's representative had always obtained in Ireland. He (Mr. Mannsell) had lately the honour of attending before his Excellency with the address voted by the society, which unveiled in a short space the great objects of the society which they were prepared to carry out—viz., Agriculture, Fine Arts, Botany, Natural History, and the maintenance of a great public Library for their fellow-citizens of this metropolis. They hoped, as the year rolled round, that they would have the pleasure of seeing his Excellency at some of their gatherings, which

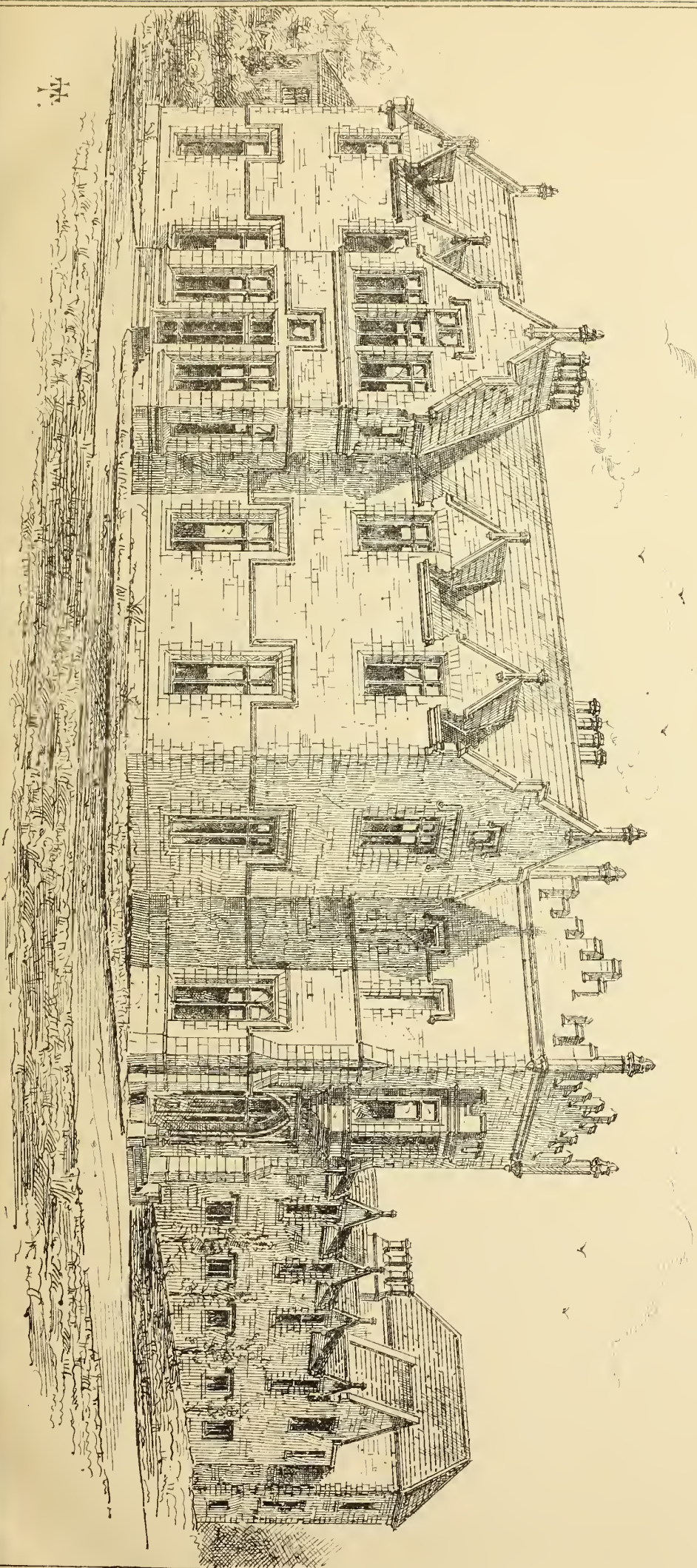
indicate one of their departments—that of agriculture. But he would not digress from the object which they were assembled for that night. They were met on an occasion of great interest to those who made art their study and also stood there for competition with all the schools of other institutions—a competition at which Dublin need not hang its head. It would be the duty of his friend who was to follow, to go more into details on the different matters connected with this training school, and with the competition which his Excellency was then to distribute the prizes for. He might mention, however, that this school had been in existence for something like 140 years, that they had connected with it at different times artists whose reputation has been made European, and whom, when they had passed away, had left regrets more enduring than brass or marble. They had among their scholars Sheas, and Danbys, and they had the name of Foley, who is now foremost in England, and others who sustained the reputation of the school wherever they went. Some two years ago, in deference to a vote of the House of Commons, the schools of art were placed on a new footing. The standard was raised up above what it had been. It was gratifying to state that, whatever were the prizes won by the students of this school under the old system, the prizes had largely increased as the standard was raised. When he informed his Excellency—which he did with some pride, as an officer of the society—that the Dublin School stands first, in proportion to the number of awards, to it as regards its number of students, of all the schools in the United Kingdom, including South Kensington—and when he told his Excellency it stood above all in the number of national awards it had obtained—he thought he bespoke for this school a character which nothing he could say could add to. Leeds carried off one national award for 409 pupils; Glasgow for 340; Birmingham for 202; Lambeth for 80; South Kensington for 588; Edinburgh for 69; and Dublin had won for 39 pupils—standing thus considerably at the head of all the schools of the United Kingdom for these awards, which are the highest as regards merit by national competition. The report went so fully in the other matters, that he did not feel justified in trespassing further on his Excellency's time. He would, therefore, beg to introduce Lieut.-Colonel Adamson, Chairman of the Fine Arts Committee.

Lieut.-Colonel Adamson said that he would not trouble his Excellency by referring at any length to the history of the schools. He thought, however, he might mention that early in the last century they were endowed by the Irish Parliament with £500 a-year, which was continued till 1829, when it was deemed advisable to apply Art to Manufacture. In 1854 they were placed under the Department at South Kensington; they were fully sensible of the great advantages derived from their connection with that institution, and they were anxious to continue it; but at the same time they found it impossible to make the schools self-supporting. Through the medium of the Royal Dublin Society's School, instruction was given to upwards of 3,000 pupils, and it had been found in every way useful and beneficial. There was one point, however, which caused embarrassment, and that was, the difficulty which the artizan class sustained in proceeding to South Kensington for instruction, from a want of time. To remedy this, the committee were very anxious to have a Museum in Ireland, from which all classes would be enabled alike to derive advantage and instruction. At present they were unable to effect the object, but they looked forward to eventually being placed in the same position as the School in Scotland. Lieut.-Colonel Adamson then proceeded to read the

REPORT OF THE COMMITTEE OF FINE ARTS FOR THE YEAR 1868.

"In presenting our report for the year 1868, we have, in the first place, to request your attention to the great success which has attended the School of

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Art of the Royal Dublin Society during the year 1868, resulting from a well-considered system of instruction.

We beg to point to the tables appended to this report, the figures of which express more strongly than we can do within the limits of a report, the results of this year's competition, and the position occupied by the Dublin School of Art, as compared with the other great Art Schools of the United Kingdom, taking as it does, a position second only to those at South Kensington.

We have in the next place to refer to the increase of students during the past year, and it is most gratifying to find that the number of those who are connected with pursuits into which Art enters as an element, have very considerably augmented—indeed, there is evidence of a desire on the part of all classes to take advantage of the instruction afforded by our institution.

It is to be hoped that the empirical teaching of so-called drawing at one time so prevalent, and still too common, may ultimately disappear, giving rise, as it does, to erroneous ideas, and preventing the reception of more correct views, which can result only from well-directed efforts and investigation.

Much attention has been given during the year to designing for manufactures, more particularly tabinets, muslins, wall decorations, carpets, pottery, &c.

The number of students modelling in clay has increased; a more complete training in the elementary branches of Art is insisted upon than in former years; and it is found that students are becoming more convinced of the necessity of a complete mastery of elementary work as preliminary to any advanced study whatever.

Numerous classes in public and other schools continue to be instructed in drawing through the agency of the Central School of Art.

The examination of such classes took place in May last.

The attendance of students at the Central School during the past year has been 519, consisting of 264 males and 255 females, showing an increase of 87 over the year 1867.

The number of students attending the Artizan Classes have been 201, of which 187 were males and 14 females.

The total receipts in fees amounted to £470 14s. 1d., including £9 from the Department of Science and Art on account of one year's instruction of three free students.

The average fee per student for 1868 is 18s. 2d."

REPORT OF THE JUDGES OF THE WORKS EXECUTED IN COMPETITION FOR THE SOCIETY'S PRIZES.

"In reporting the result of our examination of the works of students in the Schools of Art we are concerned to find, that upon this occasion the competition in a few of the sections is somewhat limited, more particularly as regards studies of a head in oil, and of landscapes from nature.

In the other sections, however, we have been much gratified by the marked excellence displayed in the works submitted, many of them manifesting a very considerable degree of attention to correct design and patient study.

We are especially pleased with the talent displayed by several of the pupils in the department of design as connected with manufactures; and, feeling that most valuable results may be expected to follow encouragement in this important department, we have ventured to recommend supplementing the prizes offered for designs for tapestry, muslins, pottery, and porcelain, many of the works in competition bearing evidence of very tasteful arrangement in design and harmony of colour."

The successful pupils were then called in turn by Dr. Steele, secretary of the society, before his Excellency, who handed them the prizes, as follows:—

ROYAL DUBLIN SOCIETY'S PRIZES.

Miss Clara Bayly, bronze medal; Mr. Michael Fitzgerald, pupil teacher, a special silver medal; Mr. Edward Gibson, second silver medal; Miss Elizabeth Bredin, bronze medal; Miss Amelia Parkinson, second silver medal; Mr. Edward Gibson, first silver medal; Mr. William Millard, for his model in clay from life, on the understanding that a similar distinction was taken by him last year for his model from the antique, first silver medal; Mr. Robert Smith, second silver medal; Miss Kate O'Brien, bronze medal; Miss Ruth Nicholson, first silver medal; Miss Frances Jordan, first silver medal; Mr. Francis Spring, first silver medal; Miss Minnie Mahony, second silver medal; Mr. Silvester Reilly, first silver medal; Mr. Albert Edward Murray, second silver medal; Mr. James Lynch, second silver medal; Mr. Walter Hope Campbell, bronze medal; Mr. Richard Dowling, first bronze medal; Mr. Thomas Tatton, second bronze medal; Mr. Silvester Reilly, first bronze medal; Mr. Joseph Johnson, second bronze medal; Miss Amelia Parkinson, first bronze medal; Mr. Francis Thompson, second bronze medal; Mr. Silvester Reilly first bronze medal; Mr. Anthony Scott, second bronze medal.

PRIZES AWARDED BY THE DEPARTMENT OF SCIENCE AND ART.

National Gold Medal—Frances Brett, design for wall decoration.

National Silver Medals—Marcella Irwin, design for a carpet; William H. Murray, design for wall decoration; Ruth E. Nicholson, design for muslin.

National Bronze Medals—William Millard, head modelled from life; Frances Seymour, group in oil.

Queen's Prizes—Edmund R. Byrne, drawing from the antique; Michael Fitzgerald, drawing from the life; James M'Donnell, group in oil; Francis Spring, design for furniture poplins.

Selections for National Competition—James Aitken, Clara Bayly, Frances Brett, Edmund R. Byrne, Michael Fitzgerald, Henrietta Hamilton, Lucy Hamilton, Elizabeth Irwin, Marcella Irwin, Elizabeth Jennings, Frances Jordan, Minnie Mahony, Margaret Marquiss, William Millard, Madeline M'Dermott, James M'Donnell, William H. Murray, Ruth E. Nicholson, Kate O'Brien, Stephen Catterson Smith, Thomas Smyth, Francis Spring, Francis Walker, F. Robert Walsh, Elizabeth Wallace, Isabella Bergin, Matilda Booth, Edward Gibson, James Lynch, Frances Seymour, Kate Seymour, Elizabeth Smith.

Third Grade Prizes—Sarah Barry, Clara Bayly, Isabella Bergin, Susan Boxwell, Frederick William Burton, Isabella Burton, Susan Davis, Eleonore Heerwart, Mary C. Lawlor, Maria M'Comb, Amelia Parkinson, Julie Mabon, Henry E. Sanderson, Emilie Smyth, Thomas Smyth.

The Lord Lieutenant, in acknowledging a vote of thanks for his kindness in presiding on the occasion, said:—

The President of the Art Department has alluded to the various changes that have taken place in reference to the connexion between this society and the Government of the United Kingdom. I may be expected to allude to them, but I don't think it would be wise for me to enter into that subject at length—not that I have not some opinion formed on that important subject, but because I know that, in a few days, an important report will be laid before the Government from the commission appointed to report on the position of the various scientific and art institutions connected with Ireland. It is a matter of great satisfaction to hear the report which has been read by the chairman from the Committee of Science and Art in Ireland on the position of this important institution in Ireland. It is satisfactory to hear of the large number of students, who studied under the auspices of the society, who have been successful in the national competitions that have taken place under the auspices of the Science and Art Department in England. It is also satisfactory to learn that the teachers here have attained great excellence, and that the teacher belonging to the society has gained second place amongst the teachers of all England. There can hardly be a more important object than the improvement of the designs connected with the manufactures of this country. I may congratulate the society upon taking so high a place amongst the other cities of the United Kingdom. I may be allowed to congratulate one person very specially to-night, and that is one of those ladies to whom I had the pleasure of presenting a prize—Miss Brett. I may congratulate her not only on having secured the gold medal in one of the national competitions, but in having become one of the scholars known as the "Princess of Wales' scholars." I do not feel that I have any right to enter largely upon the subject of Art, but I feel bound to make one or two observations. I think it is very often not appreciated how great the power of Art has on the history of the country—I mean in recording the deeds of our countrymen, and the noble acts which they do for the benefit of their country. I believe that Art, peculiarly the Art of Painting and Sculpture, takes a great part in educating one generation as to the deeds of another. Many have not time to read long writings on history, but they may possibly see the works of painters or of sculptors. It is a noble work for those who are educating the people in art, to teach men to be able with power and effect to immortalize the deeds and trace the features of those who are living in their country. I would allude to a matter which I think of great importance to societies like this. If we consider the position of art, we shall find that the atmosphere which it breathes is very different from the atmosphere it breathed in former days. The art of Rome and Greece was nurtured by the statesmen of the country. The great monuments and the statues that have come down to us from Greece and Rome were almost all designed under the guidance of the men of the best taste of the country, and were monuments of that country's greatness. In mediæval times, the religious feeling of the people encouraged art, and almost all the pictures of those days—the majority of the pictures of the middle ages—were devoted to the encouragement of religion and to the purposes of religious ceremony. Later on, the great nobles and men of riches, educated with all the taste and by all

the experience which former art had brought together in galleries, guided the art of the country. But in the present day the art of the country has been democratized, if I may so use the word. Painters have to go into the public market for those who patronize them. It is the duty of societies like this properly to cultivate taste among all classes. Let them not pander to the public taste—but let them try to immortalize the great deeds that have been, and still can be done in this country, and then they will do a great work worthy of their country. They can do what an American poet has said can be done by men. Probably, you all remember the words—

"Lives of great men all remind us,
We can make our lives sublime,
And, departing, leave behind us,
Footprints on the sands of Time."

One thing more I will say, and that is, that I should wish to see a taste for the fine arts permeate the whole country. A taste for the fine arts is, in other words, a taste for what is correct. In old days, in Italy, nearly everything that was used in daily life was remarkable for some beauty, either of form or of colour. Why should not this be so in our days? Why should we not cultivate taste in such a way that everything about us, whether the architecture of our houses, our carriages, our furniture, our crockery, our dress even should be governed by the excellence of taste. I believe there is nothing that will develop and spread itself so much as good taste; and there is no knowing what pleasure it gives to those who would have everything about them in good taste. I would make one further observation, and that is this, that while I wish to promote technical education, which I consider to be of immense importance for the development of the manufactures of the country, I think that, before all, it is necessary that the primary education of the people, whether rich or poor, should be extended more than it is at present. Unless there be that solid foundation in good primary education throughout the country, I feel sure that the efforts to promote the technical and higher education in art will not be of much avail.

PRINTING AND GRAINING FROM THE NATURAL SURFACES OF WOODS.

At a meeting of the Society of Arts, held on the 27th, Mr. George Godwin, in the chair. Mr. W. Dean described his patented process for taking impressions from the grain of wood, and transferring those impressions on to other surfaces, and which he has called "Xylography." Select a piece of wood of fine quality, about 5 feet long, 12 inches wide, and $\frac{1}{4}$ inch thick; it is, to use the technical phrase, cleaned up by the cabinet-maker on both sides, and is well sand-papered down. By having both sides of the board cleaned up, two patterns are obtained from the same board. A chemical preparation is then applied to it, which has the effect of opening the pores of the wood, and, at the same time, of hardening the surface, and, when the board is thoroughly dry, it is ready for use; and is, in fact, a wood-plate, "not graven by art or man's device," but by the Great Designer and Architect of the Universe, whose works, the most stupendous as well as the most minute, are all perfect. The material used for taking the impression is prepared in oil, and is specially adapted for the purposes of transferring. The paper, too, is manufactured for the purpose, is very thin but tough, so that it can be successfully applied to any irregular or moulded surfaces, and is sized to prevent the colour from becoming incorporated with the body of the paper. A small wooden roller is used for spreading the colour on the board, and a large, broad, flexible palette-knife is used for taking the superfluous colour off. That being done, the sized paper is placed on the board, and both are passed through a small machine having turned iron cylinders, the upper one being covered with double-milled flannel; the paper is then taken off the board, its printed surface is applied to the article to be decorated, the back of the impression is lightly rubbed with a piece of soft flannel, the paper is removed, and an exact *fac-simile* of the board from which the impression is taken is given. But that is not all, for a second and a third transfer is frequently obtained from the same piece of paper, and sometimes a fourth, a fifth, and a sixth. This is one of the remarkable features of the process.—*Builder*.

PROFESSOR THOMSON ON OUR RAILWAYS.

THE inaugural meeting of the Belfast Engineering and Architectural Association was held in the Athenæum on Friday evening, the 15th ult. The minutes of previous meeting having been read by the Honorary Secretary, Wm. Redfern Kelly, Esq., the newly-elected President, Professor Thompson, proceeded to deliver his address. He said—

He had selected, as the subject of his address, a question which is of great and wide-extending interest in connection with engineering works throughout the world, and which at present is one of special importance in reference to engineering affairs in Ireland. It was the question of the advisability of nations or communities, instead of companies, being the owners and governors of such works for public use as, from their nature, must be more or less of the nature of monopolies, and do not admit of efficient competition; and, in particular, the question now rapidly advancing in public consideration, of the purchase by the State of the Irish railways; so that the people of Ireland would virtually become the owners of the railways in their own country.

In general, he was in favour of the principle of having all such works owned and governed by the nations or communities for whose use they exist. Railways, extending throughout an entire country, and being for the use of the public generally, should belong to the State; while town water-works and gas-works, with their respective pipes under the public streets, ought properly to belong to the local community for whose special use they are established. He could not maintain, however, that local government arrangements in Ireland are as yet sufficiently perfect to render our towns in general quite ripe for organising and managing advantageously, on their own behalf, without the intervention of companies, such undertakings as the gas manufacture.

He proceeded to point out that the working of railways by companies does not accord with the general interests of the public. The aim of companies must naturally be to bring about the maximum of profit to themselves, with the minimum of trouble and risk. Their tendency will be to accommodate their arrangements to the convenience of the public, and their fares and charges for passenger and goods traffic to its advantage, just so far as, and no farther than, in their opinion will conduce to good dividends to themselves on their shares. A board of directors of a railway, who, by raising the fares and other charges, could show that they brought about an increased dividend, though accompanied by a diminution of traffic, would be deemed to have performed good service to their company; but this change would have effected a pecuniary loss to every one of the public who travelled on the railway, or sent goods by it, and would have prevented others from getting the benefit of using the railway in many cases, in which, under some other financial arrangements, they might have used it, and might have contributed something towards its expenses.

The benefit conferred on the public, in respect to passenger traffic—if we take for brevity the case of passenger traffic alone—is far above the total of the fares. Because the traveller is himself the best judge of the probable value to him of his intended journey. He will not undertake the journey unless he believes it to be worth to him at least as much as the fare; and so we may consider the fare as indicating the value of any such journey as is just at the point of being indifferent as to whether it be worth undertaking or not; but then it is inevitable that scarcely any can be just at that exact point. Any contemplated journey below it will not be undertaken; and nearly all journeys made will be above it. Many a time a person goes a journey by rail which he would value at five, ten, or twenty times the amount of the fare; often at one and a-half, two, or three times.

That relates only to actual travellers on the rail who really pay fares, and so contribute towards the reimbursement of the first costs and working expenses of the undertaking. But also those who happen not to require to travel on a certain railway near them, do receive a highly beneficial power or right, which must have to them a real value—the power, namely, of travelling by that railway whenever circumstances may lead them to want to go.

It may properly be esteemed by any member of the community as a matter of importance and of value to him to have a railway kept constantly in readiness for him if wanted to carry him rapidly and easily over what otherwise would be a long, fatiguing, and perhaps costly journey. Yet he has contributed nothing towards its construction in consideration of the advantages he holds in virtue of its existence. Thus, on the principle of having a country's railways made and worked by companies, the people benefited by the formation and maintenance of each railway are not all duly brought in as contributors. Those who do travel must then be charged for each journey, if the railway is to be successful to the shareholders, more than would be required if the contributions were levied for the railway from a larger portion of the public benefited.

A conclusion thence is, that it is sound policy, in the interest of the general public, not to arrange for levying the whole of the funds for payment of interest or profit on the original outlay, and of working expenses, by fares; but inasmuch as the general public hold a benefit in having the railway kept ready for them, whether they happen to have occasion to use it or not, they should pay by taxation, and especially by local taxation levied on the districts specially benefited, something towards the attainment of that benefit; and then that every person in travelling should have lower fares to pay, and have his interests and convenience generally better provided for, than under the present arrangements of the railways as owned and worked by companies. Another conclusion is that the construction of a railway is not to be considered as on the whole a disastrous misapplication of labour and capital, even if the income for the promoters, raised by charges on passenger and goods traffic, be totally inadequate to pay fair interest on the money sunk in their shares. In many such cases it is quite possible that the only matter to be regretted may be that some other method more in unison with sound policy for the general interests of the public had not been contrived and adopted for levying the funds for the expenses of the undertaking.

The policy thus advocated, though it would be a great change from what we are accustomed to in railway affairs, would really be no innovation with reference to well-established and successful modes of conducting other undertakings for public use. Common roads in Ireland are already exempt from tolls, and are paid for by taxation. The person using them for a journey, or for conveyance of goods, has not anything to pay, even for the wear or injury of the road due to his using it. This freedom to use the road goes far beyond what in any case would be proposed in railways, because in them, according to any propositions that are likely seriously to be put forward, local taxation would only be looked for to supply a fund supplemental to an important income to be derived from passenger fares and charges on goods traffic.

He pointed out other cases of very different kinds of public undertakings admitted to be of high public value, in which the idea of having the necessary funds levied directly as charges on the use of what is made available would be altogether untenable. One of these was that of the Ordnance Survey—an undertaking of great and general public value, and yet impossible to be done at all, if allowed only on the condition that the price of the maps sold must be fixed at such a rate as that the costs of the survey shall be compensated for by the income from the sale of the maps. Whether the price be fixed at a high

rate per map, or at a low rate per map, the cost of the survey could not be compensated for in that way; and yet no one will say that surveys of countries should for that reason be necessarily deemed misapplications of money, skill, and work.

Bridges repeatedly have been built at great cost, and for long years, owing to the obstruction of a toll-gate, have continued serving but a small fraction of the use to the public that they might serve; but, on the abolition of the toll, and the substitution of funds levied by taxation, instead of the charges collected per drive or per walk across the bridge, the service afforded by the bridge to the public has been vastly augmented, and yet the cost to the public is in no way increased by this, but it is even diminished by the saving of the remuneration to the toll-collector for his services, no longer needed. High fares on railways operate as a hindrance to the public from receiving so much as they might of the advantage rendered available by the original construction of the bridges, tunnels, cuttings, embankments, and other parts of the whole works of the line; yet, by preventing a person from travelling, no part of the first cost will be saved, but he will suffer the loss of whatever advantage the journey might have afforded him. If part of the funds were levied by taxation, and another part by fares or charges on passenger and goods traffic, the fares and other charges might be so much reduced as to effect so great an increase of the traffic as would allow of the amount to be levied by taxation being kept very small, and very little burdensome to the community, while the public would gain the triple advantage of being permitted to make more use of the railways already existing, while paying much less for each journey; and of obtaining railway accommodation in many localities to which railways could not be profitably extended on the principle of their being made and worked by companies.

The results of the elaborate investigations of the Royal Commissioners appointed to inspect the accounts and examine the works of the railways in Ireland, as embodied in their two reports, may lead us to look in hope to the prospect of the railways of Ireland being soon rendered public property, and with confidence that, in that event, if the purchase be effected with due prudence, a vast benefit will accrue to the general public in Ireland.

At the close of the address, a very interesting and instructive paper was read by H. S. Harland, Esq., on "The Paris Exhibition of 1867."

THE EDUCATION OF THE SURVEYOR.

(Continued from page 23.)

THE pupil will find the profession of which he has to make himself master divided into several branches, all more or less connected but diverse in character. These may be arranged under the following heads, viz.:—

1. Chain surveying, mapping, and levelling.
2. The valuation of land and other property.
3. The management of landed estates.
4. The improvement of landed estates, including land, the erection of farm homesteads and cottages, and the laying out and disposal of building land.

And, 1st, as to chain surveying, mapping, &c. To acquire accuracy and speed, requires several years' practice, and it is a question whether the pupil's time may not be better employed. Yet a knowledge of field work is very useful in after-life, as it enables the surveyor to test the quality of the surveys made for him by those whom he may employ; and if the pupil have time and opportunity, he will do well to acquire it. A practical knowledge of levelling is absolutely necessary for the purposes of land drainage and irrigation, and should on no account be neglected.

I now come to the second head—the valuation of land and other property. To acquire an accurate knowledge of the value

of land is, perhaps, the most important part of the surveyor's education, that in which he will find the greatest difficulty, and to which he must devote the most patient attention. During his pupilage he must expect to do little more than lay the foundation of that knowledge which only long practice and experience can so far mature as to entitle him to the confidence of the public. But it is of the greatest importance that the foundation thus laid should be sound. Suppose the pupil placed in the office of an eminent judge of land. Let him embrace every opportunity of accompanying him in his valuations. Let him not rest satisfied with recording the field values, but let him inquire into the indications on which the judgment has been formed, and the reasons for the conclusions arrived at. Let him not, however, be a mere copyist, even of the most eminent master. Let him study the elements on which the value of land depends; let him classify the various descriptions of soils, according to the amount and description of produce, the course of husbandry, the expense of cultivation. Let him learn to assign the maximum and minimum values to each class of land, and to understand the reasons why these values are applicable. Let him minutely study the indications, both general and special, of fertility and barrenness in soils. Let him study the quality and description of herbage on grass land (here a knowledge of botany will be found very useful), and the depth and texture of the soil and sub-soil of arable land. After all his pains he cannot reduce the science to a certainty, he must be content with an approximation. He will make mistakes. Happy is the surveyor who can say, that in the course of a large practice he has made but few!

The next branch of the profession to which I have to refer, is the management of landed estates. Were one to judge of the management of landed property by the description of persons to whom it is to a large extent entrusted, one would be led to suppose that it requires no special training or qualifications whatever. The fact is, the effects of good or bad management upon an estate are not all at once developed, and, therefore, good management is not always appreciated. But let not the young land agent think that he has nothing to learn. The more the details of estate management are examined, the more attention and skill will they be found to require. The fair rental of farms, the necessary amount of capital, the choice of tenants, the covenants of leases, are all matters needing much judgment and knowledge. The oversight of the tenantry, too, as regards the management of their farms, and the fulfilment of their covenants, requires considerable tact, in order to exercise a firm authority, and to command the respect and good feeling of the tenants, without descending to a system of espionage or becoming too familiar with them. The oversight and management of repairs will be found to require much practical experience, and more study than is often devoted to it. The surveyor should require some knowledge of building and of measuring work, the quality and use of different kinds of materials, and the most economical mode of executing work. A large estate requires considerable administrative talent in the arrangement and superintendence of the duties of subordinates and workmen. The care of woods and plantations also calls for much skill and attention to develop the growth and to increase the annual produce. In fine, he may be described as a model land agent, who knows how to make the most of an estate without racking the rental, how to select and encourage good tenants, how to combine improvement with economy, and how to promote that mutual confidence between landlord and tenant which ought ever to exist on every well-managed estate.

My fourth head, the improvement of landed estates, is yearly becoming of more importance, owing to the increasing spirit of improvement which prevails. It is, therefore, worthy of the especial attention of the young

surveyor. It is, however, a question for consideration how far this branch of the profession can be combined with general practice. Every surveyor ought to be well versed in the homestead requirements of farms of various extent and description, so as at least to be able to sketch the general plan of a homestead. But the detailed plans, working drawings, specifications, and estimates require the knowledge of an architect—a knowledge which needs as much time and attention to acquire as the general practice of the surveyor. Few can devote sufficient time to obtain a practical knowledge of both professions; and I am, therefore, inclined to the opinion that the erection of farm homesteads must be regarded as a specialty, requiring a particular education distinct from that of the land-agent and valuer. The same remark applies to the art of scientific land drainage, which in its highest sense requires special study, and is, perhaps, best carried on as a distant practice.

I will now suppose the young surveyor to have spent three or four years as a pupil in an office of extensive practice; that he has made the most of his time and advantages, and has acquired a fair knowledge of his profession. He should now make himself acquainted with the practical details of farming; and, with this view, he should spend at least two years under the tuition of a first-class farmer, partly, perhaps, on a heavy, and partly on a light soil. The knowledge thus acquired will be found of great value in after-life. Without it, indeed, the surveyor, however competent in other respects, will find himself at a disadvantage, especially in his oversight of the farming of the tenantry on estates under his care, and in settling and discussing the covenants of leases.

Let not the surveyor, who has gone through the whole of the training indicated in this paper, and is now about to enter into practice, think that his education is complete. Perhaps there is no profession that depends so much upon a long course of practical experience for the attainment of a matured skill and judgment. The education of the surveyor must be life-long. He must never be too old to learn, and to be conscious that he is liable to error. He who is most awake to the mistakes he has made will be most likely to avoid them in future, whilst he who will never admit that he is wrong will probably repeat his mistakes to the end of chapter.

A mere knowledge, however, of the profession will not suffice to command success, unless accompanied by habits of business, knowledge of men, and tact and address in his intercourse with others. In these respects the surveyor must educate himself; without these qualifications a man of sound and varied knowledge may be beaten in the race by another of inferior acquirements who possesses them. If the surveyor would be a man of business, he must learn the art of executing whatever he has in hand with skill, decision, and despatch. Let him avoid those dilatory habits which have been the bane of some able men in the profession, and let him act upon the maxim, never put off till tomorrow what can be done to-day. He should also endeavour to acquire that business tact with which some men are naturally more gifted than others, and which mainly consists in a knowledge of men, and of the mode of laying your views before them so as to command their assent; or, in short, of saying the right thing, in the right way, and at the right time. The talent of administration is another point of great importance; without it, indeed, no large business can be properly carried on. It may be defined as the talent of so arranging the duties of the office as to get through the greatest amount of business with the least waste of power, and of so classifying the various departments under responsible heads, as to avoid confusion, and to relieve the principal of matters of detail. With some men this is a natural gift, and has contributed largely to their success in life: other men of undoubted talent and unwearied industry find that for want of it their

business is always a burden, and always in arrear. If, therefore, the young surveyor have not the natural gift, let him spare no pains in its acquirement.

ARMAGH NATURAL HISTORY SOCIETY.

On Monday evening a lecture was delivered before the above society by William Gray, Esq., C.E., of Belfast. The subject was "The Irish Elk."

Mr. Gray commenced by noticing two important facts relative to the history of our world:—one was the geological, which related to the interior structure of the earth; the other was the historical, which had reference to man and his works. With regard to the boundary of the earth, that was a matter which could not be thoroughly ascertained. The Irish Elk was an animal which existed anterior to the creation of man. There was a popular notion of late respecting the world's history; and it had been ascertained that its age was written upon the incrustations of the earth. Time, however, was hard to measure; and as the rate of deposition, or the time occupied in the formation of different beds of strata, whether by the slow means that are in operation at present, or a more rapid deposit, unknown to man, could not be clearly determined: and hence geologists could not do more than set forth the relative ages of the different phenomena, or altogether fix any measure of geological time. They had divided them into four life-periods. The first, or azoic period, was devoid of organic remains.

The lecturer proceeded to explain the cause of the difference of temperature in different countries. He next dwelt upon the drifting and transportation of chalk, lime-stones, and other substances from rocks and mountains into southern countries and districts to which they did not belong, where they were used for farming and building purposes. The question was—How were these detached masses of granite, &c., transported? Subsequent to the period of organic activity, the north of Europe became gradually submerged, and the effect of a constant stream conveyed glaciers from the mountains and swept them into the valleys, carrying with them fallen rocks, and depositing them in hollows and caverns miles distant from their original resting-place. The lecturer here exhibited several specimens found at Castle Espie and other places, and showed the marks and scratches caused by the drift; he also exhibited a specimen of drift deposit which he had found near the railway station in Armagh that evening, with scratched boulders exactly similar to the other specimens. These currents and eddies of inland seas were also changed with the alteration in the configuration of the land, and therefore the drift was washed down and redeposited in other places. These deposits formed large heaps of drift sand, drift clay, and drift boulders, and this submerging brought the land to a high level. The remains of the Irish Elk, with other extinct mammalia, were discovered in the county of Antrim and other places in Ireland. The teeth of an elephant had also been found in a drain in Antrim in 1718. The remains of the hippopotamus and reindeer had also been found, which probably were contemporary with the Irish Elk. It was an erroneous notion to suppose that the latter was always found in peat or turf. They were never found in this substance, and it was important to know this fact, as to whether they became extinct before or after the human epoch. From his own experience and observation, he knew that they were not found in peat. The largest quantity of remains of the *Magaceros Hibernicus*, or Irish Elk, was to be found in the county of Down. They were also discovered at Banbridge, Carrickfergus, and sometimes near Dnndalk. A great many of these remains were destroyed by the country people; and while antiquarians were anxiously seeking for and gathering them to decorate the halls of naturalists, or to be exhibited in

munsems, they often found their way into the bag of the rag collector, and afterwards went under the grinding machinery of some bone manufacturer.

Mr. Gray explained the difference between the American and the Irish Elk (a large skeleton of the latter was exhibited), the principal difference being that the horns of the American were smaller in proportion than those of the Irish Elk. The skeleton of the latter was seldom found perfect, the antlers in most instances being broken off. Sometimes they were found without skulls: the lecturer accounted for this by remarking that they were probably torn by wolves or other wild animals. He also exhibited the horns of the red deer and the reindeer, which were generally found in the beds of rivers, and were contemporaneous with the Irish Elk. Some horns of the red deer were found in High-street, Belfast, several feet below the surface of the earth, and eight or ten horns were found when sinking the foundation for Shillington's mill. A number of years ago the antlers of a large elk were once exhibited as the arms belonging to one of the late Irish giants. The elk was generally found in the marl below the bog; if otherwise, it would favour the idea that man and the red deer were contemporaneous.

Another interesting fact had been ascertained about elks—the skeletons were frequently found with their horns locked into one another. The lecturer inferred from this that they were accustomed to fight, and when the horns became entangled, they died in that position. Mr. Gray concluded a most instructive and entertaining discourse by remarking that he was justified in saying that the Magaerous did not exist before the historic period, and most probably was extinct before the creation of man.

Subsequent to the delivery of the above lecture, a correspondent of the local *Gazette* took exception to the statement made by Mr. Gray as to the remains of the Elk having never been found in peat. The writer says:—

The recent lecture of Mr. Gray on the Irish Elk has opened up several interesting points. He, however, made a statement which may be open to objection. He affirmed that the remains of the Elk were never found in peat, but always in the marl beneath that element—a statement I am inclined to dispute. A few facts connected with the Elk found in the neighbourhood of Armagh may be interesting to your readers. About ten years ago there were found the remains of three Elks in the townland of Ballygroobany, nearly midway between Hamiltonsbawn and Richhill. A bog had been drained and turf made, and this led to the finding of the remains. The bones were discovered by a farmer named Heatley, and two skeletons passed into the hands of Thos. Dobbin, Esq., who presented one of them to Lord Gosford, and the other to his Grace the Lord Primate. The third skeleton reached the hands of Mr. J. Wilkin, of Armagh, who sold it to an English society for £25. The antlers in possession of the Primate measure 8½ feet from tip to tip. This is somewhat under the average, which is about 10 feet. The animal was not in proportion to the size of the horns. Its height was about 8 feet, or the size of a horse, and they were gregarious and moved in herds. An exceedingly able monograph on the Elk has been published by Dr. Thomas Molyneux, with a fine engraving of the horns, and may be seen in the public library of Armagh. Molyneux conjectures that the Elk was contemporaneous with man. The remains of another Elk were found in a bog near Summerhill, on the property of Sir J. Stronge, a few years ago, and ultimately passed into the hands of James Wilkin.

SUBMARINE DRILLING AND BLASTING.

The difficulties of navigating the East River entrance of New York harbour, especially by vessels of considerable draft, occasioned by natural obstructions, have been recognised

ever since the settlement of Manhattan Island. About sixteen years ago the height of the sunken rocks was considerably reduced by the Maillefret process, which consisted of lowering cans of gunpowder on the rock and exploding them by the galvanic battery and connecting wires, the theory being that the superincumbent mass of water formed a resistance of fulcrum against which the explosion might react. But where the rock presented a smooth surface without salient points, this method has not proved satisfactory. In consequence the attention of engineers has been directed to the provision of some more adequate means. The United States Government having appropriated 85,000 dols. towards the improvement of New York harbour, and General Newton, United States engineer, having advertised for proposals, the contract for the removal of the Hell Gate obstructions has been awarded to Sidney G. Shelbourne, of New York, who, on the 15th of December last, gave an exhibition of his machine, its powers being exerted on a block of hard Quincy granite. The principal part of Mr. Shelbourne's machine is a cast iron casing, in form a depressed semi-spheroid, or shallow inverted bowl, 7 feet in diameter. It has three solid steel feet or toes by which its stability on the rock is secured. Rising from the upper part of the casting is a conical wrought-iron frame, supporting the upper end of the drill shaft by means of two parallel rods entering into sockets in a cast ring at the top of the frame. The bar passing up through the centre of the top is furnished at the bottom with a bit, 1½ in. in diameter, and having embedded in its face nineteen diamonds, and rotating at the rate of from 300 to 500 revolutions per minute, advancing at the rate of from 1 in. to 1½ in. in the same time. The feed is caused by a differential gearing which steadily operates to advance the drill into the rock, the debris being washed away by the water forced into contact with the bit through a small rubber hose. The water-tight chamber of the machine contains a pair of engines working at right angles to each other, with a horizontal stroke. As soon as the hole is completely drilled, and also when the drill-shaft is withdrawn from the rock, information of this is given by a magnetic bell, which is acted upon by a double wire cord insulated from the water and passing down one of the parallel rods or tubes upon which the cross-head is fixed. The drill weighs nearly five tons. It will be worked from a wrecking tug with a derrick by means of steam supplied from the boiler of the tug. To prevent this steam being condensed in its passage through the water to the engine, it is conveyed in a hose surrounded by another, through which the exhausted steam passes. The rock which will be drilled in the Hell Gate is that known as the bastard granite, and is much softer than either the Quincy or Maine granite, on which the drill has been satisfactorily tested. After a number of holes are drilled over a certain space a diver will descend and charge them with cartridges of nitro-glycerine, which will be exploded in the usual manner. In connection with the drill another very ingenious and automatic machine will be used to grapple and raise the fragments.—*Scientific American*.

THE CROSS STEEPLE, PAISLEY.

The Paisley Town Council have held a special meeting to consider the advisability of taking down the Cross Steeple, in consequence of its insecure condition.

A letter was read from Mr. John Crawford, in which he objected to the taking down of so venerable a structure as the steeple, merely because an alarm had been raised that it was in danger of falling. If it were resolved to take it down for the purpose of improving the street, it might be reasonable enough.

Mr. James Parlance said a gentleman had told him that a certain institution in the town would be quite willing to remove the steeple free of expense *provided it received the stones*.

Mr. James Anderson said he did not care

whether they took down the steeple or not, but it would take 200 years to complete the improvement. It would also add considerably to the taxation. He thought the steeple could easily be sorted if they had just hove at the other side of the foundation and let it fall down there as much as it had sunk in the opposite side. There had been a heap of groundless fears about the steeple falling, but it was a mighty power to draw down.

The chairman said, when the steeple was built, upwards of a hundred years ago, no doubt the street was quite wide enough for the trade and traffic of Paisley. It then contained only 7,000 people, and now it contained 47,000 persons, and surely that number would not boggle at taking the old steeple down and building a new one.

A motion in favour of the removal of the steeple to a new site was ultimately agreed to.

NEW ROMAN CATHOLIC CATHEDRAL, QUEENSTOWN.

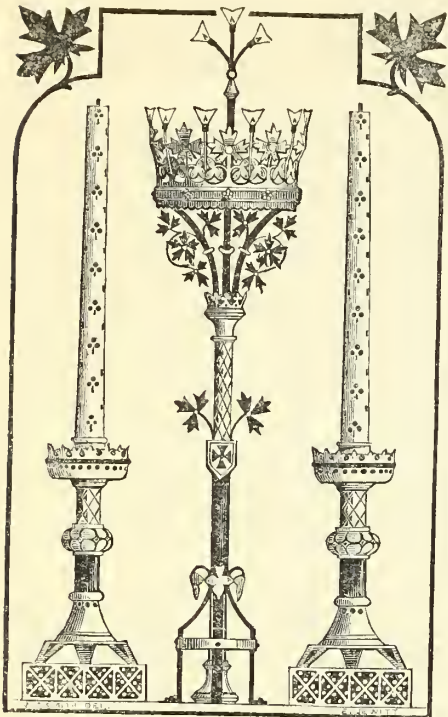
In our number for October 15th, 1868, we gave an account of the laying of the first stone of this important church. We find the following particulars in a circular issued by the bishop of the diocese, from which it will be seen that the contract for the erection of the cathedral has been given to Mr. Michael Meade, Great Brunswick-street.

It appears that steps were taken to collect funds as far back as ten years ago, and up to September last the sum of £15,000 had been collected. The circular then goes on to state what has been done:—

The site of the old chapel was to be the site of the new cathedral. A more beautiful or a more convenient site could not, after the closest inquiry, be found. It is nearly central from west to east, and from north to south; and it is so elevated that the church will be visible from every part of the harbour. It had two disadvantages. It was too short, and at one end it was too narrow. With all the ground that could be taken from the yard and presbytery, there could be space for a building only about 140 feet long by between 70 and 80 feet broad. To add to the length, two houses on the terrace next to, and on a line with, the presbytery were purchased and taken down; to widen the front to the required breadth, the road was changed; and the ground thus gained is now enclosed within the foundation walls of the church, which can therefore have the more symmetrical proportions of fully 190 feet long in the clear, of over 70 feet broad for nave and aisles, and of nearly 110 feet in the transepts, with full room for the tower and spire at the front southern angle, and sufficient elevation throughout for the clerestory. Yet the site is so limited that, during the erection of the new church, the old building could not be retained. It became unavoidably necessary to provide a temporary chapel for the parishioners; and that the outlay may not be lost, the house prepared for this purpose was so constructed that, on ceasing to be necessary as a chapel when the new church is opened, it can at a small expense be converted into Christian Brothers' schools, which will be large enough for the accommodation of seven hundred pupils.

The widening of the road in front required a large expenditure, inasmuch as it could not be effected without a high, long, and thick wall of solid mason work. But the most costly undertaking as yet has been the foundation. The site is on a sloping rock, on the southern side of which it was necessary in some parts to sink 24 feet below the level of the future floor of the church, while in other parts a firm bottom was found at a depth of only 4 feet. The cost of these excavations and of heavy massive foundation walls to be raised all around to the uniform level of the cathedral floor, could be so little calculated on beforehand, that the church committee, guided by the best advice they could have, decided on doing this part of the work on

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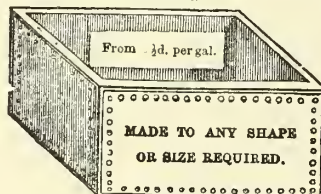
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TESTIMONIALS.

From WILLIAM TITE, Esq., M.P. for Bath, and Architect of the
Royal Exchange, London.
House of Commons, 2nd March, 1864.

DEAR SIR,—In reply to your note, I beg to say that I have
used both the sort of Cement manufactured by your firm, and
that of Messrs. Francis & Son; I mean the Cement usually
called Roman Cement, or the more recent introduction of
Portland Cement. I believe these Cements, manufactured by
either of your firms, to be equally good. I know no differ-
ence, chemically or practically, between them; and I should
use, and authorize to be used indifferently, either one or the
other. You are at liberty to use this note, if you think it ne-
cessary.—I am, Dear Sir, your obedient servant,
Messrs. White & Son. (Signed) WILLIAM TITE.

From R.O. MINNIE, Esq., Surveyor to Board of Ordnance, London.
War Office, Pall Mall, London, S.W.,
3rd March, 1864.

GENTLEMEN,—In reply to your request, I have much plea-
sure in stating my favourable opinion of the quality of your
Portland and other Cements, which have been extensively
used in the Public Works connected with the War Department
at home and abroad, especially in several of the fortifications
now being erected in this country. On all occasions within
my knowledge the quality has been equal to that of any other
manufacturer, and has given great satisfaction.—I am, gen-
tlemen, your obedient servant,
(Signed) R. O. MINNIE, Surveyor.

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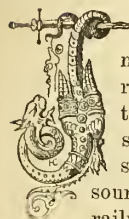
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The Irish Builder.

VOL. XI.—No. 220.

General Railway Prosperity.

N anticipation of the Government taking up and managing the railways of this country, it is only to be expected that those holding shares therein, and those deriving salaries and emoluments from this source, will wish to represent Irish railway affairs, if not exactly *couleur de rose*, at least as a most lucrative property. Everywhere there seem to be brisk efforts making to show how a line of railway, however it may appear to disadvantage, is planned and worked in just the manner it should be, and in the best and only manner it could be. The interests of the country are represented as identical with those of railway shareholders. That is to say, when dividends of a respectable percentage are declared, and the shareholder feels a tangible evidence in his pocket that the line is paying, he comfortably supposes that the country generally shares in the prosperity.

The sooner this fallacious notion is exploded the better. So great may be the eagerness to show how the railways of Ireland pay, in order to obtain a higher price from Government in the event of a purchase, that the object may be defeated. The very cause of the appearance and discussion of the question has arisen from the general mismanagement, or rather from the want of management, in the system of Irish Railways. We say this advisedly. Not that the strategy of intense cupidity has been wanting in the management of various lines. Such, it must be admitted, seem to be the foundations of railway management in Ireland. The pocket of the shareholder seems to be the Alpha and the Omega of the railway alphabet. True, we do not forget that there are chairmanships, directorships, and deputyships, &c., that swallow up a considerable amount of the earnings of railways; and the policy of railway companies now seems to be by no means to lop off expenses in this direction, but rather the contrary. Spasmodic efforts are at the same time put forth, in order to make it appear that there exists a value which does not really exist.

The public is the victim. Although it furnishes the support—in some cases an inadequate one, as Irish railways are at present managed—yet now-a-days it cannot even meet with courtesy in connection with the awkward and bungling arrangements given. The Government, however, is not likely to be deceived in the matter. Irish railway management has arrived at a point where not only does the question of governmental management form a part—and a most essential part—of legislative policy, but it has become evident that the railway management of this country proceeds on a principle which cannot but make matters worse and worse. The principle to which we allude is, that of reducing to a minimum the number and the pay of the working officials, increasing the number and the pay of the managers, directors, and superior officers, and thus giving to the public the minimum amount of

accommodation in order that the shareholder may have the maximum percentage.

Of course it is not always easy to define the limits of liberality or illiberality of a railway company in justice to the shareholders. Indeed this is one of the difficulties of railway management. Still it is quite certain that as the public is the end of the existence of railways, it is an indispensable element in railway management; that, whatever be the condition of the concern financially, the public should be treated with courtesy and consideration. This is one of the elements in which Irish railways have failed. Those railways that have not realized the expectations of the promoters, seem to treat the public with absolute insult. Others, which have to some extent answered the public utility, and what is more, put money into the purses of the directors, take credit at this juncture for having effected an extended, indeed a national, benefit. It is, perhaps, to some extent, excusable in shareholders who have realized a profit to suppose that it indicates a general prosperity. At a meeting of the Northern Counties Railway the other day, Sir C. Lanyon, the deputy chairman, said:—

“He joined sincerely in the remarks of congratulation which had fallen from the chairman with reference to the prosperity of the line. It was a matter for congratulation, not only to the shareholders but to the country, for it not only shows that the line itself is favourably circumstanced, but it also showed that there was a certain amount of prosperity existing in the country generally, and he thought that, on that account, it was a matter of congratulation, not only to the company but to the country generally.”

The “country generally,” we think, will not exactly be persuaded of this. In fact, the truth will be found in the converse. We need use no more conclusive argument than that furnished at this same meeting with regard to policy of management; which seems to be that of nearly starving the working officials (on whose attention to duty the safety of the public depends) in order to make handsome dividends.

“Mr. Brown said there was a serious matter which he wished to call their attention to—an item of nearly £1,000 as compensation for accidents. Now, his opinion was that nearly every accident which occurred could be avoided, and arose from the neglect of railway servants. Now, they should have security on all their officials, and when an accident occurred, if a servant was at fault, the security could be looked after.”

We hardly know whether this, coupled with the following statement, is sarcastic or not; but considering the wages of pointsmen, we incline to take it so:—

“Mr. E. McNeill—We lost £1,000 through the neglect of a pointsman at Ballymena, and you could hardly ask a pointsman to give that amount of security.”

This pointsman, it appears, was not overpaid. The general manager says:—

“It would be difficult to make a pointsman, earning 12s. or 13s. a week, responsible. One lately was prosecuted and convicted; and in other cases when accidents had occurred through carelessness, men had been punished and dismissed.”

Passing from this line, which seems to be in the prosperous condition of being able to pay a dividend of 5 per cent. to its shareholders, let us take a glance at the Belfast, Holywood, and Bangor Railway, as our attention has been specially called to it by the letters of the manager in the public papers.

This line is in financial difficulties. The principal town through which the line passes is Holywood. So unsatisfactory—at least to the public—is the way in which the public are treated, that a steamer is to be put on to ply between Belfast and Holywood for the better accommodation of the public. In

alluding to public meetings which have been held for this purpose, the manager of the line says, in a letter to the principal papers of Belfast:—

“I also perceive that an effort has been attempted to destroy the cordiality which at present exists between the town of Holywood and the management, and the absurd notion of a steamer between Belfast and Holywood revived. Such a step would be advantageous to the Railway Company, for it would give the directors the best possible excuse for assimilating their fares and train accommodation to that generally in use when the programme would stand thus:—A special train would be put on to compete with the steamer (while it was continued), both for speed and fares—and every other train would be rated at a third or half more, with a handsome advance upon the subscriptions. The trains would be reduced in number, and the last train available for subscribers would be 8.30 p.m. The 10.15 p.m. would be constituted a special train at the advanced fares. ‘The Birds of Paradise’ would then fly to the chimneys of the smoke-begrimed city, and fraternise with the daws and republican sparrows, declaiming against landlords as social monsters. ‘Liberty! Equality! Fraternity!’”

The meaning of the phrase “birds of paradise” is, it appears, to be found in the *lapsus lingue* made by a speaker at one of the above meetings, where he meant to say, referring to the Holywood people, “birds of passage.” Holywood is a populous suburb of Belfast, and its main support is from business men who have residences there, and go to and fro by rail.

We have given instances of the sort of railway management but too general in Ireland. In our present remarks on “General Railway Prosperity,” those words are of course to be understood in an ironical sense, where indeed the truth is found.

ARTISTIC METAL WORK.

MESSRS. Brawn and Downing, of Birmingham, have favoured us with a series of photographs of works recently executed by their firm. To give anything approaching a correct description of the beautiful Art specimens represented by the pile of photographs lying before us, is a task for which we do not feel ourselves competent. We must therefore rest satisfied by merely mentioning a few of the more prominent and noteworthy amongst them. The first two are of gates in hammered iron, executed for the Duchess of Northumberland; then come the principal entrance gates to the Birmingham Exchange; gates for the new Market Hall, Bethnal Green, London; an exquisitely-designed pair of carriage gates next come in view, and in admiration we ask how it was possible to carry out in hammered iron such a closely arranged pattern—we have never met anything to equal the workmanship on these gates; suffice to say they are a credit to the firm by whom they were produced. Amongst the gas brackets is one of large size, in polished brass, and which is worthy of attention; it has been, we understand, executed for the Marquis of Hastings. An eagle lectern in polished brass surpasses, both in design and beauty of finish, any of those previously turned out, and figured in their lithographed catalogue; to the aid of photography, of course, is due its faithful representation now before us. For upwards of twenty years Messrs. Brawn and Downing confined their manufacture to the “Gothic” style of work; within the last two or three years they have very judiciously turned their attention to the execution of brass and iron works in the various styles prevailing in this age of Art-progress. In a notice, some months ago, of the new Church of St. Bartholomew, Elgin-road, we stated that the cresting and finials thereon were supplied by this firm; we hope soon to be able to mention their names in connection with other works here. The photographs may be seen at our office.

MECHANICAL ARTS.

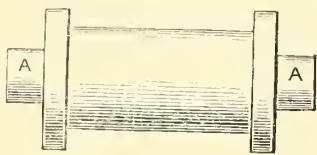
IRONFOUNDING.

(Continued from page 30.)

LARGE castings are moulded either in 'baked sand' or in 'loam.' Green sand moulds, even when well rammed, are very incohesive, so that when castings are large, and especially if they are tall, the hydrostatic pressure of the metal against the sides of the mould is so great as to overcome any resistance which can be offered by ramming the sand. In such cases the sand is wetted with water, and after being moulded in much the same way as in green sand, the moulds are baked or dried to hardness in an oven. The baked moulds are supported on the outside by an iron casing made up of several pieces, and perforated with holes to allow the air to escape. The iron casing is held together by means of iron bars and wedge bolts. Baked sand allows the air to pass through it much more freely than green sand; and castings made in moulds baked are generally more smooth and sound than those made in green sand.

Baked sand is also used for making what is termed 'cores,' in green sand moulds; cores are parts of the mould where the sand is partially enclosed with the metal, as when holes or interstices of any kind are required in castings. In some cases it would be impossible to make green sand serve for cores, as they could not be made support their own weight; in other cases they might support their own weight, but would be liable to be swept away by the metal running into the mould. The cores are made of yellow sand, moistened with a pasty mixture of clay and water. They are formed in iron or wooden boxes of the required shape, into which the mixture of sand and clay is rammed. If the cores happen to be of a slender form there is generally a piece of iron wire put into the centre of them to strengthen them. They are thoroughly dried before using, and are supported in the mould by having projections which are sunk in the sand and tightly embedded in it. For cored work the patterns are prepared with projections called 'prints,' which make indentations in the sand to suit the cores.

Supposing it were required to cast a small hollow cylinder with a flange on each end, it would be evident that the core could not be made of green sand, as it would fall to pieces. The core would require to be made of baked sand, and would be supported by its ends projecting a certain distance into the sand. To suit the projections of the core, the pattern would be made with two prints, *a* and *a*, as seen in the annexed figure. The



core would be merely a solid cylinder of baked sand, and would be placed in the mould as seen in figure 2.

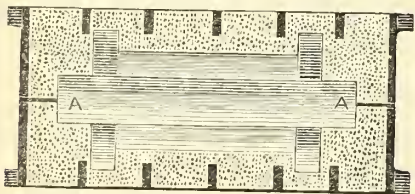


Fig. 2.

In cored work a great deal of skill is required in the management of the air or gas which is generated by the contact of the hot metal with the baked sand. It is essential that there be a free passage left for the escape of this gas, otherwise it will make its way through the molten iron and destroy the casting. Horizontal cores require more attention than vertical ones, as both ends are buried in the sand, whereas one

end of vertical cores generally reaches the surface of the floor, and thus the gas can escape. Whatever position a core may happen to be in, there must be a channel leading from it to the surface of the sand.

Loam moulds are built of brickwork, and faced next the casting with a pasty mixture of sand, clay, water, and cow hair; or, in some cases, horse dung or chopped straw. Patterns are not necessary in loam moulding, the mould being formed by means of what might be called traversing templates. Before the metal is poured, the moulds are thoroughly dried, either where they are built, or in a stove. The brickwork is secured on the outside, either by being sunk under the level of the floor, and having the sand of the floor rammed tightly up against its sides, or else it is secured by means of iron rings and straps.

ROYAL INSTITUTE
OF THE ARCHITECTS OF IRELAND.

THE monthly meeting of the above Institute will be held on Thursday evening next. Mr. J. H. Owen, Fellow, will read a paper on "Damp," and the discussion on "Cheap Dwellings for the working classes in town and country," will be resumed.

THE ROYAL DUBLIN SOCIETY.

A SCIENTIFIC meeting was held on Monday evening in the Council Chamber of the Society, Kildare-street.

GEORGE J. STONEY, Esq., LL.D., in the chair.

Dr. J. Emerson Reynolds, Keeper of the Minerals and Analyst, R.D.S., read an interesting but technical paper on the estimation of soluble and insoluble phosphates in superphosphate of lime, and other phosphatic manures. The object of the paper was, essentially, to report upon the results of an elaborate series of analysis which the author had conducted in the chemical laboratory of the society, with a view to establish a rapid and trustworthy method of estimating phosphoric acid—one of the most important constituents of the artificial manures, now so largely employed in agriculture. The process of volumetric analysis described in the paper is based upon a suggestion made some years ago by a distinguished French chemist, but to which little attention has since been given. Dr. Reynolds has taken advantage of this suggestion, and succeeded in arranging a rapid and accurate process for the volumetric analysis of phosphoric acid. Dr. Reynolds also made a communication upon a convenient mode of separating oil and fat in effecting the analysis of linseed, rapeseed, and other feeding cakes.

Dr. Tichborne, Chemist to the Apothecaries' Hall, spoke of the value of the appliances referred to by Dr. Reynolds. Some of them he had tried years ago, and had given up, but he had no doubt that the improvements made in them by Dr. Reynolds would render them of great practical value.

The chairman said he regretted very much that his own knowledge of chemistry was not sufficiently accurate to enable him to speak complementarily in references to these two interesting papers. He, however, proceeded to speak at some length on the important work that was being accomplished by the various scientific bodies both in London and Dublin, and of the able manner in which some of the less technical portions of the papers were treated.

Mr. Robert S. Ball, A.M., Professor of Mathematics, Royal College of Science, exhibited "Plateau's experiment on a fluid removed from the action of gravity." A large glass vessel, containing a mixture of alcohol and water, is employed. Into this a quantity of oil is introduced of precisely the same density as the alcoholic mixture. The oil forms a beautiful sphere suspended in the liquid of from two or three inches in diameter. By a spindle a movement of rotation is communicated to the liquid globe. It is

first seen to flatten at its poles and bulge out at the equator, and with increased velocity the oil forms a ring around the axis, immediately suggesting Saturn's ring. These phenomena were exhibited to the audience by an enlarged view, projected on a screen of a magnified image of the sphere.

THE ROYAL GEOLOGICAL SOCIETY
OF IRELAND.

THIS Society held its annual meeting on the 11th inst., in the Museum Building, Trinity College, Robert Callwell, Esq., in the Chair. The following report was read:—

"At the close of this, the fifth year of the existence of the Royal Geological Society of Ireland, the Council have to congratulate the society on the satisfactory condition of their affairs. Numerically the ranks of fellowship have not diminished during the past year, and the evening meetings have been interesting and largely attended. Within the past year we have lost one Fellow by resignation and one by non-payment of subscription, and death has deprived us of one of our most active and valued members, Mr. George V. Du Noyer, of the Geological Survey, whose recent loss to science will be fresh in the memory of the society. Mr. Du Noyer was elected a member of the Geological Society of Dublin in 1856, and was a contributor to the pages of our Journal on many occasions. His papers on the geology of Kilkee, of Killarney, Cahircorree, and of the cuttings on the Dublin and Belfast line of railways evince his powers as an investigator and his thorough acquaintance with the subject. The Council cannot let this opportunity pass without recording their deep regret for his sudden removal from amongst us. We have gained two new Fellows by election to fill up the ranks vacated by death and resignation. Our meetings have been, as usual, the means of making public interesting investigations, mineralogical and palæontological. On the former branch of geology papers have been read by Professor Haughton, Dr. Reynolds, and Mr. Westropp. One of the most interesting facts reported by Professor Haughton was the discovery of albite felspar, as a constituent of the granite in Cornwall, which forms an interesting link in the series of investigations made under the auspices of the Royal Society of London and this society by Professor Haughton, in connection with the nature and origin of granite. As a result of this series of researches, Professor Haughton infers that there are two separate kinds of granite, metamorphic and intrusive—the former typified by the granitic rocks of Donegal, Skye, and Norway, the latter by the rocks of Leinster and Cornwall; and these, he believes, may be discriminated mineralogically, the intrusive granites being characterised by possessing albite, the metamorphics by containing lime felspars. Dr. Reynolds submitted to the society analyses of specimens of rutile, which are of interest, as they were the first examples of this mineral found in Ireland. He also laid before the March meeting a notice of the nature and mode of formation of these singular markings called Dendrites. The same gentlemen read, at the May meeting, a sketch of a new classification of silicates, based upon the model of the hydrates of silicic acid in varying degrees of condensation, the water being replaced by different bases. Our palæontological papers have been few, but of considerable value. Mr. Harte, the active and energetic surveyor of the county Donegal, exhibited and described a singular organism, probably echinodermal, from the yellow sandstone. At the same meeting a very interesting original collection of casts of coprolites from Lyme Regis, made by Dean Buckland, was presented to the society by our president, the Earl of Enniskillen. In petrology our attention has been directed by Professor Haughton to the axes of elevation in the carboniferous limestone of Lancashire, and he has worked out the interesting problem, that these axes are easily explicable on simple mechanical principles. Lastly, our attention has been directed by the valuable paper of Dr. Stokes, to the subject of the growth of bog, a subject which is of great interest, either in a geological, archaeological, or agricultural point of view."

The following were elected as Fellows:—Ramsay H. Traquair, M.D., and Edward Macaulay Hartrick, C.E.

Papers were read, in continuation of the discussion of Dr. Stokes's paper "On the rate of growth of Bog," by J. Scott Moore, "On the probable age of a Cache near Blesington," and "On the growth of Turf Bogs of fibrous character;" and by M. Alphonse Gages, entitled "Critical Observations on the probable age of Turf."

An interesting discussion ensued on the reading of these papers.

L A W.

COURT OF COMMON PLEAS—Feb. 15.

(Before the Chief Justice and a Common Jury.)

THIS was an action brought by Mr. James Scanlan, builder, against Mr. J. M. Craig, the proprietor of the "Pembroke Drug Hall," Upper Baggot-street, Dublin, for the sum of £72 6s. 6d., balance due at foot of a building contract, and for £50 claimed for loss incurred by reason of defendant's having withheld the specification and other documents, and for the neglect of the defendant's architect in not supplying the necessary working drawings and directions for carrying on the works.

The defence was, that the sum of £59 7s. 6d. only was due, which sum was kept back by defendant as penalties for the non-completion of the contract on the day named in the agreement between the parties.

We give a more extended report of the case than its importance, judging by the amount claimed, may warrant, as we believe that it contains many points of interest to parties engaged in building, especially on the question of *penalties*.

The facts of the case as given in evidence were—that plaintiff engaged in April, 1868, to execute certain works for the sum of £225, according to the plans prepared by Mr. Wm. Sterling, architect, the work to be finished by the 3rd of June, 1868, under a penalty of £2 per day. The contract was signed on the 21st April, and the works commenced on that day. The contract was based on a bill of quantities, which was prepared by the architect, and no working drawings were given at the time. Plaintiff alleged that it was arranged with the architect to meet on the day after the contract was signed, to get the working drawings, &c. Mr. Sterling, who was then surveyor to the Pembroke Township, resigned his situation on the 23rd April, and got a fortnight's leave of absence pending the appointment of his successor, and did not give plaintiff the instructions required, and could not be seen except on a few occasions during the progress of the works. Some of the working drawings were not given for one month after the date named for the completion of the work.

When the works were finished, the architect and contractor met to settle the accounts; it was then arranged to forego the claim for penalties on either side, and, after giving credit for omitted works and allowing for extra works, the sum of £72 6s. 6d., as alleged by plaintiff was found to be due, but according to the architect's statement there was only £59 7s. 6d. found to be due. The defendant refused to pay either sum, and claimed the sum of £2 per day for every day the works were unfinished after the 3rd June—the works were not finished till 11th July.

This amounted to more than the amount claimed, and there was no money lodged in court.

The Solicitor-General in opening the case on the part of the plaintiff, said that in the absence of his learned friend, who was to have opened the pleadings, he would briefly tell the jury the nature of the case which they had to try. The action had been brought by Mr. Scanlan, his client, who was a contractor for buildings, and whose reputation was well sustained in that professional capacity, against the defendant who was a druggist, whose establishment was situated in Upper Baggot-street. He (the Solicitor-General) would tell exactly the precise facts of the case. In April, 1868, Mr. Craig, the defendant, had been anxious to effect alter-

ations in a house in Upper Baggot-street. For the carrying on of his business he had deemed it necessary that such alterations ought to be made. He employed Mr. Sterling as his architect and Mr. Scanlan as contractor. Engaged as the contractor, an agreement is entered into between all parties, and that agreement he (the Solicitor-General) now produced. [Document of agreement read.] The contract was for a sum of £225, and the works executed were admitted to have been properly done, even according to the statement of the witnesses who might, perhaps would, be produced on the opposite side. He would, before going further, remind the jury that the contract had been a contract accepted by tender; and after the agreement had been made, Mr. Scanlan proceeded to execute the works.

His lordship—Is there any traverse?

The Solicitor-General—No, my lord; and what is more, it is set out on the record—the pleading has it set out *in verba*. But the point comes to this, the necessity to have "working drawings," and these working drawings ought to have been supplied—by whom?—by the architect engaged in this transaction, a Mr. Sterling. Now Mr. Sterling is absent when those drawings are wanted—nay, more—are absolutely required. Absent in Belfast and various other places; and after the plaintiff had received various communications, the working drawings appeared. The character of the work would involve a matter of great detail. The learned counsel then proceeded to particularize the various items set forth in the specification, and having done so, said that the plaintiff would himself tell them that he could not carry out the suggestions—in fact the propositions of Mr. Craig—for the want of the plans, which were not forthcoming; and towards the end of June, last year, Mr. Scanlan said to the defendant, "I have sustained a great deal of loss, my time has been occupied, and I have been idle instead of doing my work. Now I give you warning that I hold you responsible for the loss I have sustained." Sterling comes back and says to the plaintiff, "You had better look sharp, you are bound to have the works done on the 3rd." They were completed on the 11th. Plaintiff then asked to have them taken up. The answer again is—and that from defendant—"I cannot take up these works until Mr. Sterling comes"; Sterling only returns on the 7th of August, when he visits the work, and after fully examining it, he sits down with plaintiff and tells him that the amount of his claim is £72 6s. 6d.

The Chief Justice—When was that?

The Solicitor-General—On the 7th August. And that is what we complain of—the delay. Mr. Scanlan, having accepted this settlement, which was made in one of the rooms in the premises in Baggot-street. Sterling left the room, leaving Mr. Scanlan to await his return. Into another room he went, where defendant and his father-in-law (who, I believe, is the author of this litigation), were. Mr. Sterling comes back, and, with a long face upon him, seeing that the matter was broken up, says, "Mr. Craig's father-in-law has come in, and refuses to pay the amount we have agreed on; he then offers £40, which my client refused; subsequently £50 was offered. It was also refused, and what we are here now for is the sum of £72 6s. 6d.; and we also claim damages for the loss of time and the delay. The father-in-law, as I have said, had to be consulted, and, in that consultation, the reduction, such as you heard, was suggested. They say, that according to the contract price, you only did work to the amount of £203, and that we gave you £150; and as to the rest of the contract, you owe us for forty-four days, at the rate of so much per diem, for the non-completion of the works, a sum of £88. That gentleman, is substantially, the case for you. You will have to try whether plaintiff has executed those works; whether, having done so, he is entitled to his fair and legitimate demand for the same, having due regard to the execution of the contract and the instructions which he received, as will be proved to

you in evidence. With these remarks—and, indeed, I do not think it necessary to tender any other—I submit the case, gentlemen. I will only add that I do not disparage, I do not blame the conduct of Mr. Sterling; but at the same time I think that it was rather hard that my client should be called upon to pay penalties, and penalties at the rate of £2 a-day for that which he ought not in justice to be made in even the slightest degree liable.

Mr. James Scanlan, the plaintiff, examined by the Solicitor-General.—Is a builder and contractor; was invited to tender for the alterations at the house No. 22, Upper Baggot-street, by Mr. Sterling, the architect, who was then the surveyor or engineer to the Pembroke Township Commissioners; had been previously spoken to by Mr. Sterling, who expressed a wish that he would tender for the work. The tender was sent in on the 18th April, 1868, for £245: on the following day the defendant, Mr. Craig, called on him and stated that he did not intend to lay out more than £200; told defendant that if he struck certain works out of the estimate he might bring the amount down to the sum he wished to expend. The estimate was founded on a bill of quantities prepared by the architect, which was a very unusual proceeding in this country, but was frequently done in England.

The Solicitor-General—Did you ever know a case in Dublin where the architect took out the quantities for his own work?—I don't believe there is an architect in Dublin who would do so. Quantities are, I may say, invariably taken out by a building surveyor, which is a separate and distinct profession. Did you pay the architect for this work?—Yes, the amount I paid him was included in my estimate, and of course formed portion of it.

The Chief Justice—Who pays the architect?—The employer pays the usual commission, which is a quite different matter from the payment for the "*quantities*." Met the defendant and Mr. Sterling on the 20th April, when he refused to reduce his estimate, and on certain items being struck out, the amount was reduced to £225. Mr. Sterling drew up an agreement which was signed on the following day, in which he was bound to have the work finished on the 3rd June, 1868, under a penalty of £2 per day; began the work that day; told the architect, Sterling, that it would be necessary to have the working or detail plans made out at once, and that as the time was so short, he should supply them at once. The architect promised to do so, and appointed the following day to meet him. Called on the following day, and found that Mr. Sterling had resigned his situation as the surveyor to the Pembroke Township, and had got leave of absence pending the appointment of his successor. Witness next saw him at the works on the 9th May, when he complained of his not having kept his appointment, and also pointed out several mistakes in the drawings which could not be carried out, and which had kept the work from being proceeded with.

The Lord Chief Justice—What were those?—The first was a mistake in the measurements; a vault or basement story was shewn to be seven feet deep, whereas it was found to be only 2½ feet; a room was found to be 2 feet longer than shewn on drawings, and several others. The mistake in the height, as shewn in the basement, prevented the works being begun, as the intention was to put the shutters into this vault, but when the building was cleared away, the defendant saw it was impracticable, and prevented it being adopted. When this was pointed out to Sterling he admitted the error, and on his return on the 9th May gave the working drawings asked for. He was not again seen at the works till the end of May, during which time he was wanted to be consulted. Witness went to look for him to No. 8 Abbey-street, where he learned he had an office; could never see him there.

The Chief Justice—This is very extraordinary. Is Mr. Sterling in court? Let him be sent for if not.

There was no one in his office to represent him, and witness did not know his private address to write to him. There was a slate outside the office door, upon which witness wrote a request to see him (a laugh); went several times to the Court of Exchequer between the 10th and 18th of May, where he learned Mr. Sterling was in attendance in the case of *Fogerty v. Moore*; could not get him to go to the works; when he did go at the end of May he (plaintiff) had to make his own details, with the approval of defendant, and when the architect saw this he objected.

The Chief Justice—What did Mr. Craig say all this time?—He said he would never pay Sterling one penny, that it was very bad treatment for all parties. On the Saturday after the contract was signed, the defendant asked witness to lend him the specification and detailed estimate to take copies for his own use; gave them to him; asked for them several times during the following week, was told that they had been returned, but subsequently defendant gave them to witness on the 12th May; these documents were indispensable to the carrying out of the works; complained to Sterling of this when he came to the place; the changes made by defendant in the absence of Mr. Sterling were incessant; the works were completed on the 11th July, when he told defendant to get his architect to take up the work, that it was now completed; defendant said he would do so, and that he would not open the place for business till the account was settled. Sterling was again absent, and after keeping possession of the place till the 18th July, he then directed the key to be given up to defendant. Mr. Sterling did not come from Belfast till the 7th of August, when they met at the works; and after a minute inspection, Sterling admitted that the works were satisfactorily executed, and proceeded to settle the account. Witness had previous to this furnished his account, in which he charged £50 for the loss occasioned by the delays caused him through defendant and his architect's fault. After Sterling's final examination of the works, he asked witness to forego his claim to the £50 for delays, and asked to have the account gone into on its own merits; to this witness assented, and they both sat down in Mr. Craig's parlour; and when the account was gone through, and after giving credit for £150 paid on account, there was found due £72 6s. 6d., which witness was satisfied with. When this was done, Mr. Sterling went into the shop to defendant, and returned in a few minutes and stated that defendant's father-in-law has just come in, and had refused to pay the amount, and should insist on the penalties of £2 per day; at this witness was very indignant, and asked for a certificate from Mr. Sterling for the £72 6s. 6d., which he refused to give. Witness then copied into his note-book [produced] the result of the calculation made by Mr. Sterling, shewing the £72 6s. 6d. due. Sterling then, after another consultation with defendant, offered £40, which witness refused, and left the place after telling Sterling his conduct was both unprofessional and unfair. Next met in two days after, when he told witness that the defendant's conduct was bad, and that witness was justified in taking steps to recover the amount, but asked time for a few days to try to arrange it. Witness agreed, and on the 12th August called on him, when he was shewn a letter from Craig to Sterling, asking the latter to dine with him (defendant.) Witness then got disgusted with him, and went to his solicitor. [A letter was here read from witness to defendant (July 24th), saying, that as there was no chance of Sterling coming to settle the account, he would not ask him any more. Another letter was read from witness, telling defendant that the expense and exposure of the law was the only way to treat conduct such as his.] Witness now fully endorses this opinion.

Cross-examined by Mr. Carleton, Q.C.—You say this contract was signed on the 21st of April?—Yes. When did you ask for the detail drawings?—On that day, and fixed

next day to meet him. You say you did not meet him till 9th May?—I did not, though I repeatedly called to look for him. Did you write to him?—No, I thought it no use when I found he was not in town. Where did you call?—At the Pembroke Township office, where I learned he had got a fortnight's leave of absence, and had left town; I called repeatedly at 8 Lower Abbey-street, where I could only see a slate hung outside the door, and I then despaired of seeing him, and went on as well as I could without him. Were those working plans necessary?—Yes; Mr. Sterling told me not to do anything without details, but, if left to myself, I need not delay for them, as I could work on from the small plans. Did you attend to this matter yourself?—Yes, close personal attention was paid the work, and I would have had it done before the time if I had not been delayed; there is scarcely anything done as originally intended; the changes made by Mr. Craig were incessant—he had a right under the contract to make alterations. Did you complain to him of Sterling's neglect?—Yes, repeatedly, and he said it only remained for him not to pay him one penny; told Craig on the 27th June the work was done as far as it could be done without plans, and no work was done after that date but from drawings got on 2nd July. Was not the amount settled between you and Mr. Sterling on the 7th August £59?—It was not. On your oath, do you repeat that?—Most distinctly and decidedly; there was no amount but £72 6s. 6d., nor did I ever hear of such a sum till I saw their defence; and if this were so, it is not likely they would afterwards offer me £50, if the amount I agreed to take was only £59 instead of £72 6s. 6d.; I asked Sterling to certify for the £72, and told him he was not acting as he ought to do, independently between all parties. Did you receive this letter from Mr. Sterling, giving a list of works unfinished?—Yes; but I took no notice of any communication from the time he made the final inspection of the work in August; I deny that anything is imperfect.

The Chief Justice to Mr. Carleton, Q.C.—Do you really expect to get penalties against the plaintiff? I know I will not give him any penalties against you; and I also know the jury will not give you any penalties against him.

A juror—According to your own account you owe him £59.

Michael Foran, clerk to plaintiff, was examined, to prove that the works began on the day the contract was signed, and that there were enough of men and materials on the works to have them completed on the 3rd June.

E. P. Gribbon, architect and surveyor, examined—Has examined the works at 22, Baggot-street; considers the work very well executed, and value for the amount claimed; went through the bill furnished by plaintiff, and thinks the amounts for extra works reasonable; it is the usual custom for architects to supply detail drawings when the works are commenced, and the works in question could not be carried out without working plans.

Cross-examined by Mr. Monahan, Q.C.—Examined the works on Saturday last; cannot say the exact time he was there; was long enough to make a fair examination of the works; went there with Mr. Scanlan, who pointed out the works to him; the work could not be done in the time if the delays alleged took place.

This closed plaintiff's case.

Mr. Sterling was then called, and on his entering the witness-box, was presented with the book. He said—My lord, it is a very inconvenient and vexatious matter to me that I should come here.

The Chief Justice—And where do you come from?

Witness—I reside at Kingstown, but I have an office in Dublin.

The Chief Justice—That is very annoying, but I cannot help that.

Mr. Sterling was then sworn and examined by Mr. Monahan, Q.C., as follows:—Are you an architect?—Yes. Have you had long ex-

perience in that capacity or profession?—I have had fifteen or sixteen years' experience. You recollect the occasion when this contract was entered into between Mr. Craig and Mr. Scanlan?—Yes. I believe it was you who invited Mr. Scanlan's tender?—Yes; there was a proposition made.

The Chief Justice—You invited it?—Yes. Does not recollect what the original amount of the tender was, but it was afterwards reduced to £225.

The Chief Justice—Before you came into court, Mr. Scanlan stated that he would not reduce his charge one farthing; but that if there were to be any reduction, it should be by the striking off or the striking out of certain items.

Witness—There were several items to be left out.

The Chief Justice—And the tender was accepted for £225. [The specification was here handed in and marked; the drawings were also produced; the witness for a considerable time failing to identify the working drawings which were used at a subsequent period of the work. He further deposed, that he had left Dublin for Belfast on the 22nd of April, last year.]

The Chief Justice—Where were you on the 22nd of April?—I was in Dublin. How long were you away?—Up to June?

The Chief Justice—This is a very curious transaction.

Witness—I require to refer to my memorandum?

The Chief Justice—Do so.

Witness—I went to Belfast on the 5th of May—I mean I went on the evening of the 4th of May?

The Chief Justice—How long did you remain there?—I returned by the five o'clock train on the 8th.

The Chief Justice—Now where were you—and let me ask you to be cautious in your answer to my question—where were you from the 21st April to the 4th of May?—I was in Dublin. I had a place in No. 8 Lower Abbey-street.

Did you use it, that is to say, the place in Abbey-street, as an office?—Yes. But had you it as an office, open, or supposed to be open, for your business purposes. Had you any clerk there?—No, my lord, not a clerk, but a person who received letters for me. And if you were asked for, would you be seen?—I never considered the person a clerk, and the only purposes for which he was engaged was to receive letters?

The Chief Justice—In the early part of Mr. Scanlan's examination he said that the first time he saw you as to this matter was on the 9th of May—that is to say, he saw you as to complaint. He stated that he had complained to you of the drawings, or the wanting of the drawings?—That was the first time that I heard anything except as to the vault and the window enclosure.

Is it true that on the 9th May the plaintiff complained to you of the want of drawings?—He never informed me.

The Chief Justice—Sure you have spoken of drawings; it is before us that the contractor had got the drawings, but that they were subsequently taken from him.

Mr. Monahan—Is that a right copy of the drawing? [document produced]—Yes.

The Chief Justice—Now let me ask you, as I understand you, you had an office; well now, how long did those parties remain away from your office, or you from it?—I was away on one occasion.

The Chief Justice—For how long?—On one occasion for a fortnight, and then there were a few days.

The Chief Justice—Now, with the exception of these few days and the fortnight, could any person have come into your office?—There was a person there who received my letters.

The witness, in the remaining portion of his direct examination, exhibited a rather vague recollection of the dates of the transactions entered into between the contractor and himself, which elicited some strong observations from the Chief Justice. On his

being questioned as to the exact facts that occurred at the time the meeting between all parties took place, he was unable, either from memory or by the means of a diary, to answer. Hesitation having overcome the patience of the Chief Justice, his lordship said—"Oh, give it (meaning the diary which the witness held in his hand) to me."

The Solicitor-General—I never knew a man who kept a diary able to give a date when required.

Here witness could not point out the figures in his book which he said contained the list of extra works, but shewed the calculation of the various items set forth in his "calculation of reductions." He persisted, however, in his closing answer, that the delay had not been caused by any fault of his—by his absence from Dublin, and by his not having supplied the "drawings" setting forth the alterations from the original specifications supplied to the plaintiff.

Cross-examination by the Solicitor-General—Now you say that this document was in your hand on the 7th of August?—Yes. Now show me the £10 you allowed for extra works?—We did not go into that. Had you any paper at the time of the taking of the figures?—Not to my recollection. Did you see Mr. Scanlan take out his note-book and copy the items?—He told me he took a note of it. What time? Was it whilst you were making out the items?—Yes. On your oath, did you see him taking that down in his memorandum book?—I do not know what he took down, but he told me he was taking down what was going on; I do not recollect having a sheet of foolscap. You said he was quite indignant at the offer of the £40; did you go down then to Mr. Craig?—I went into the shop, and—Did you come back again, and say that the father-in-law insisted upon the penalties?—I did.

The Solicitor-General—Take these drawings in your hand; was not that given to Mr. Scanlan on the 2nd July, one month after the time for having the works finished?—I see the date written on it 2nd July. Could that particular work be done without the drawing?—I gave verbal directions by which I thought it had been done. Are you not aware that the defendant would not have or adopt the drawing for the window enclosure as originally designed by you?—I made another, when asked for it. Yes, and the contractor was for weeks waiting for this; and when he gave defendant notice that he would wait no longer, and charge for the delay, you then served him with notice that you would charge him £2 per day for the time he was waiting?—I was not the cause of his waiting, as far as I know. Look at this large plan of shop front; when was that given?—When I was asked for it, after I came back from Belfast on the 9th of May. Is not that a departure from the original drawing?—It could be done from the small-scale drawing as well. Then there was no use for it?—Any intelligent man may carry out the work from the drawing. On your oath, are not both drawings quite different?—They are both the same, but one is larger scale than the other. Is not the one different in every way from the other—in fact 8 inches of difference in the height of 2 feet? [Witness took out his rule, and after considerable time acknowledged that there was a difference, but could not say how much.]

His lordship—Mr. Solicitor, we will take your measurement of it 8 inches.

The Chief Justice then interrogated the witness with reference to his absence from Dublin during the alleged delay and the execution of the work; and on further cross-examination by the learned counsel, he (witness) admitted that he was the man who was to have settled the account between the plaintiff and defendant. He said that on the 27th of April last he had opened a place at 8, Lr. Abbey-street—that it was an office.

His lordship—Who represented you there whilst you were away? was it the hall door or a clerk?—A person not a clerk; but one who could only take letters. Where were you from the time you got leave of absence

from the Pembroke Commissioners until this particular day? Where were you to be found, supposing I wanted you on a matter of business or anything else?—There was a slate there (laughter). Your residence was in Kingstown and the slate in Abbey-street. Supposing now that I called while you were here, who would answer me?—There is some one there now.

The Solicitor-General—And you made all these reductions in the account from time to time since the works were done?—Yes.

His lordship—You made one, we will say, yesterday, another to-day, and another may be done to-morrow?—Yes, but I did not take a note of it. But everything went on smoothly up to the time the work was finished?—Yes.

His lordship—Exactly until the payment, and till Mr. Knaggs appeared. You may go down now Mr. Sterling.

Joseph Manifold Craig, the defendant, examined by Mr. Carleton, Q.C.—Is the defendant in this action; signed the contract on the 21st April; did not see Mr. Scanlan for three days after, as he went to the country on that day; did not know that he was delayed for want of working plans; he took the specification and detailed estimates from Mr. Scanlan, as stated by him, but returned them within 48 hours; does not know the exact date on which he did so; paid Mr. Scanlan £150 while the work was going on, as arranged in the agreement.

Cross-examined by Mr. Falkiner, Q.C.—You are a "bit of an architect" yourself, I believe?—No, I am not. Did you not alter almost every item of the work in the absence of the architect?—I gave directions to omit matters which I did not require to be done, and in order to reduce the expense. Cannot swear that he did not keep the specification for ten days; does not think he retained it till the 12th or 14th May, seventeen days—he found it amongst his papers; cannot swear that Mr. Scanlan complained to him that it was delaying the work; recollects the vault for storing the shutters under the shop being found to be not the size shewn on the plan; the plan was impracticable; he did direct that the plan for shop window enclosure should not be carried out; gave verbal directions for what he wished done; does not think that all the work was done on the 27th June, except this particular work; brought a plan from Sterling for it on the 2nd July or thereabouts; the work was not completed on 11th July; did not get the key till the 17th; was asked by Mr. Scanlan on the 11th July to get the architect to take up the works; does not think it was keeping possession of the place for the sake of getting the account settled, that kept the men there till the 17th July; always told Mr. Scanlan that he was ready to open business in forty-eight hours after getting up the place; did not open till 30th July; it was not true that he could have opened within forty-eight hours; paid Mr. Scanlan £60 on the 3rd June, the day named for giving up the work; did not say a word about the delay; did not complain of the delay till 29th; Mr. Scanlan had not before that told him that he would charge for delays; wrote to Mr. Sterling to Belfast, that Scanlan was insisting on a settlement of the account; has not the letter now; recollects the time Mr. Scanlan wanted the sketch for the cornice, when Sterling could not be found; it was done from Mr. Scanlan's own sketch, with his (witness's) approval; cannot say that Sterling afterwards told Scanlan that he should have waited for a sketch; did not hear Scanlan say that he would wait no longer, that he was tired of the humbug. The reductions in the estimate came to more than the extra works.

The evidence on both sides having closed, the Chief Justice intimated that he would direct the jury to find for the plaintiff. He would hear anything the counsel might wish to say.

Mr. Monahan, Q.C., then addressed the jury on behalf of the defendant. He said that the issue for their consideration was one of an extremely simple nature. The whole question is this—you will have to consider whether the

value of the work was £72 or £59. However, you have heard the evidence of Mr. Gribbon, who comes and swears that he thinks his friend's (Mr. Scanlan's) account is perfectly fair and correct. Now if Mr. Scanlan had a fair ground for having a proper estimate placed upon his work and labour in this particular matter, he would have given something more in detail. That closes the first observation; and the second observation is that which I have perhaps already made or alluded to. It is this, that the only other witness besides Mr. Gribbon is that of the plaintiff himself—his testimony you have heard, and upon the whole of the case I submit that the verdict ought to be for the defendant. I do not think it necessary to go further into the details of this case—it is a simple, an easy one—but I have thought it my duty to say these few words, brief though in number, before altogether closing this case.

Mr. Falkiner, Q.C., on the part of the plaintiff said—Gentlemen of the jury, my learned friend, Mr. Monahan, has stated that he would not occupy your time at any great length, and inasmuch as you yourselves have heard the case so fully, believing that which the poet states—

"Brevity is the soul of wit;"

I shall endeavour to follow his example, and I will endeavour to confine myself to the limit. But the question which I shall clearly prove—prove to you beyond black and white—that my client, the plaintiff in this matter, was not in any manner responsible for the allegations made against him. Let us look into the matter. It is pretended—aye, it is said, even, that this Mr. Sterling has had an office in Lower Abbey-street. The plaintiff goes there—no reply is received, and after and after again the old story of absence, *non me recordo* is given; but in this case he goes out—where? Out at once to the house, where was to be found old Knaggs. He became inexorable; he is "death on penalties." Sterling returns to the contractor, and says that, though he has a case, of course there is nothing for it but to submit;—but no—no submission was there on the part of my client, and he therefore felt it his right, his proper and his manly duty, not only to himself but to his profession, to bring this matter before a jury of his countrymen, in whose confidence, in whose integrity, and in whose regard for justice he fully confided.

The Chief Justice, addressing the jury, said—Gentlemen, the whole question in this matter—about we have heard so much, and respecting which we have wasted so much time—actually resolves itself into a very narrow and limited compass. The question really is, what is the sum due—whether it is £72 6s. 6d. or £59? Now, taking the matter in its fullest light, having regard to all the facts of the case—the witnesses upon the one side, the evidence upon the other,—it will be for you, gentlemen, to say whether you accept the evidence given for the plaintiff for his demand for the £72, or the evidence adduced for the defendant as regards the deductions.

The jury were then directed to retire, and after three minutes' deliberation, they returned into court with a verdict for the plaintiff for the full amount claimed, and 6d. costs.

Counsel for plaintiff—The Solicitor-General, Mr. Falkiner, Q.C., and Mr. Philip Keogh; attorney, Mr. Thomas J. White. For defendant—Mr. Carleton, Q.C., Monahan, Q.C., and Mr. E. M. Kelly; attorney, Mr. John Frazer.

[We heard it stated in court that the costs were likely to be more than the amount of the verdict, and we hope it will be a lesson to parties who have no better case in disputing a claim of this kind, than endeavouring to enforce penalties for delays caused by themselves, and it would be well to remember the remark of the Chief Justice in closing this case—"I have been sitting here for twenty years, and I never knew of penalties of this kind being enforced, and I hope I never will."]

Galwey v. Charing Cross Hotel Company.—

This was an action brought in the court of Queen's Bench, Westminster, by a gentleman, in consequence of his wife having broken her leg by falling down a staircase in the Charing Cross Hotel. The stairs in question are called the "Second Visitors' Stairs." They are 5 ft. wide, with 12 in. treads and 6 in. risers, and at the quarter-spaces there are winders 4½ in. wide in their narrowest parts. The handrail is carried by balusters let into the ends of the steps. It was contended by the plaintiff that the winders were a source of danger, for which the defendants were liable, and the damages were laid at £1,760. The plaintiff's counsel read medical evidence taken in Dublin, to the effect that Mrs. Galwey was injured for life, and that the fracture was of a very bad description, known as "Pott's fracture." Mr. Galwey, jun., Mr. E. Nash, Mr. E. Roberts, and Mr. E. Tasker were called to show that the winders were dangerous, and that there was not sufficient light when the accident occurred. They all admitted, however, that they had frequently used winders in their own practice. For the defence it was shown that nearly 300,000 persons had visited the hotel since its opening, and that about 150 servants were there employed, but that no complaint had ever been made of the stairs. Mr. E. M. Barry and Professor Kerr stated that the stairs are in every way safe, and such as are ordinarily constructed; that they are lighted by a skylight over the well-hole, and eleven windows besides borrowed lights, and that though they are necessarily darker at the bottom than the top, there is no such deficiency of light as to cause danger.

The following members of the profession were in attendance to support this view, but were not called:—Mr. T. H. Wyatt, Professor Hayter Lewis, Mr. Clifton, and Mr. Marrable. Mr. P. C. Hardwick was prevented from attending in consequence of a recent accident. Mr. Plucknett and several practical witnesses were also called. As regards the medical evidence, Mr. Hancock, senior surgeon of Charing Cross Hospital, and Mr. Lee stated that the injury had been exaggerated, that it was not "Pott's fracture," and that in their opinion Mrs. Galwey would soon be as well as she had ever been.

Mr. Justice Lush told the jury that if they thought the company guilty of negligence, the verdict should be for the plaintiff, with proper damages; but that there was such a thing as plaintiff's negligence. The company had a right to expect ordinary care and caution from those who used their premises, and ought not to be punished for their negligence.

The jury withdrew for a short time, and found a verdict for the defendants.—*Builder.*

Gahan v. Pratt.—This case, which was to have been tried in the Court of Exchequer, has, we are glad to learn, been left to arbitration. The plaintiffs, Messrs. Gahan, builders, took proceedings for the recovery of a building account for works executed for Captain Pratt, of Kilbride. It appears that the works had never been actually completed by the contractors, in consequence of differences having arisen between plaintiffs and defendant. The latter called in a building surveyor, measured up the works executed, and took them out of the plaintiffs' hands, and then employed other tradesmen to finish them. Mr. McCurdy, the arbitrator, awarded the plaintiffs £220 and the costs up to the date of this sum having been lodged in court, the subsequent costs to be borne equally by plaintiffs and defendant.

AN EXTRAORDINARY DISCOVERY.

A PIECE of news reaches us through the *Missouri Republican* which, if it should prove to be true, is of the highest historical interest. But is it true? The engineers engaged in making the piers of a railway bridge, at St. Louis, to cross the Mississippi, are said to have found an ancient tunnel below that mighty river! Details are given. The tunnel, we are told, "passes under the river

to the Illinois shore, and whether it is wholly the work of some ancient race who once inhabited this land, whose interesting remains are strewn so thickly up and down this great valley, or whether it is partly natural and partly artificial, remains to be seen. In any case it is none the less stupendous. The main passage we should judge to be about 20 feet high by 15 feet broad, and systematically arched overhead; part of the way by cutting through solid rock and part by substantial masonry. The bottom seemed to be much worn, as if by carriage-wheels of some sort. There are many lateral passages which, of course, we had no time to enter. These are about 8 feet high and 6 feet wide. In the main passage we saw no tools or implements of workmanship; but on entering one of the lateral passages we soon emerged into a large chamber supported by leaning pillars of solid rock when the chamber was excavated. Around the walls of this chamber there were what seemed to be niches closed with closely-fitting slabs, each slab covered with inscriptions in Runic uniform characters which to our eyes bore a marvellous resemblance to those upon the slab in the Mercantile Library, which was brought from the mines of Nineveh. Between the niches were projecting pilasters, with draped Assyrian or Egyptian heads, which presented a most impressive and awe-inspiring effect as they were illuminated by the torch-light. Those sweet, sad faces looked down upon us from the ancient ages, like the souls of the departed."

If this report is not a joke of the "Western Boys," it brings us the most important evidence yet produced of the existence in ancient days of a civilized race in the great valley of the new world. The fact of the tunnel occurring just at St. Louis is suspicious. If the facts are truly stated, an ancient city must have stood on the Mississippi, near to St. Louis, though probably on the opposite bank. If so, the cases of Memphis and Cairo will have found a parallel in the new world. [We wait for further detail; but we fear the "discovery" is all a joke.]—*Athenaeum.*

NEW HIGH ALTAR, CATHOLIC CHURCH, BALLYRAGGET.

Our illustration in this number is a drawing of the new high altar to be erected in Ballyragget Catholic Church, for the Rev. Thomas Walsh, P.P., from the design of Mr. G. C. Ashlin, Dublin. The work will be executed in Caen stone, with red and green marble shafts, the altar top to be of white veined marble. The subject selected for front of altar is the Adoration of the Lamb, and for the panels in reredos the subjects are, on the right-hand side, the Sacrifice of Melchisedek, and on the left, the Sacrifice of Abraham; the centre panel under the canopy contains the Crucifixion. All the sculpture will be highly relieved, and the cornices, caps, &c., will be richly carved. The tabernacle will be of brass, gilt, engraved, and beaten.

The altar measures on top 10 ft. by 2 ft. 4 in., and from upper step to marble top 3 ft. 6 in. in height; the super-altar projects about 1 ft. beyond face of reredos.

We understand that two side altars are also to be erected in this church at the east end of aisles, also from Mr. Ashlin's design, under whose direction the recent improvements to this church have been carried out. These alterations and improvements consisted mainly of a new ceiling to nave and aisles, groined in plaster, with molded ribs, bosses, &c., and new flooring, tiling, and open benches.

The contractor for the works was Mr. Murphy, of Waterford; but Mr. Bourke, of Gloucester-street, executed the plastering.

BRITTAS HOUSE, QUEEN'S COUNTY.

THE perspective view given in our last number represents the new mansion to be built for

the Right Honourable F. P. Dunne, at his seat, Clonaslee. The site is most advantageously chosen over the slope of a hill, overlooking a beautiful undulating and well-wooded country. The whole of the external surfaces are to be of punched sandstone, with chiselled limestone dressings. The cost will be about £7,000.

RIGHT- AND LEFT-HAND LOCKS.

[From the *Builder.*]

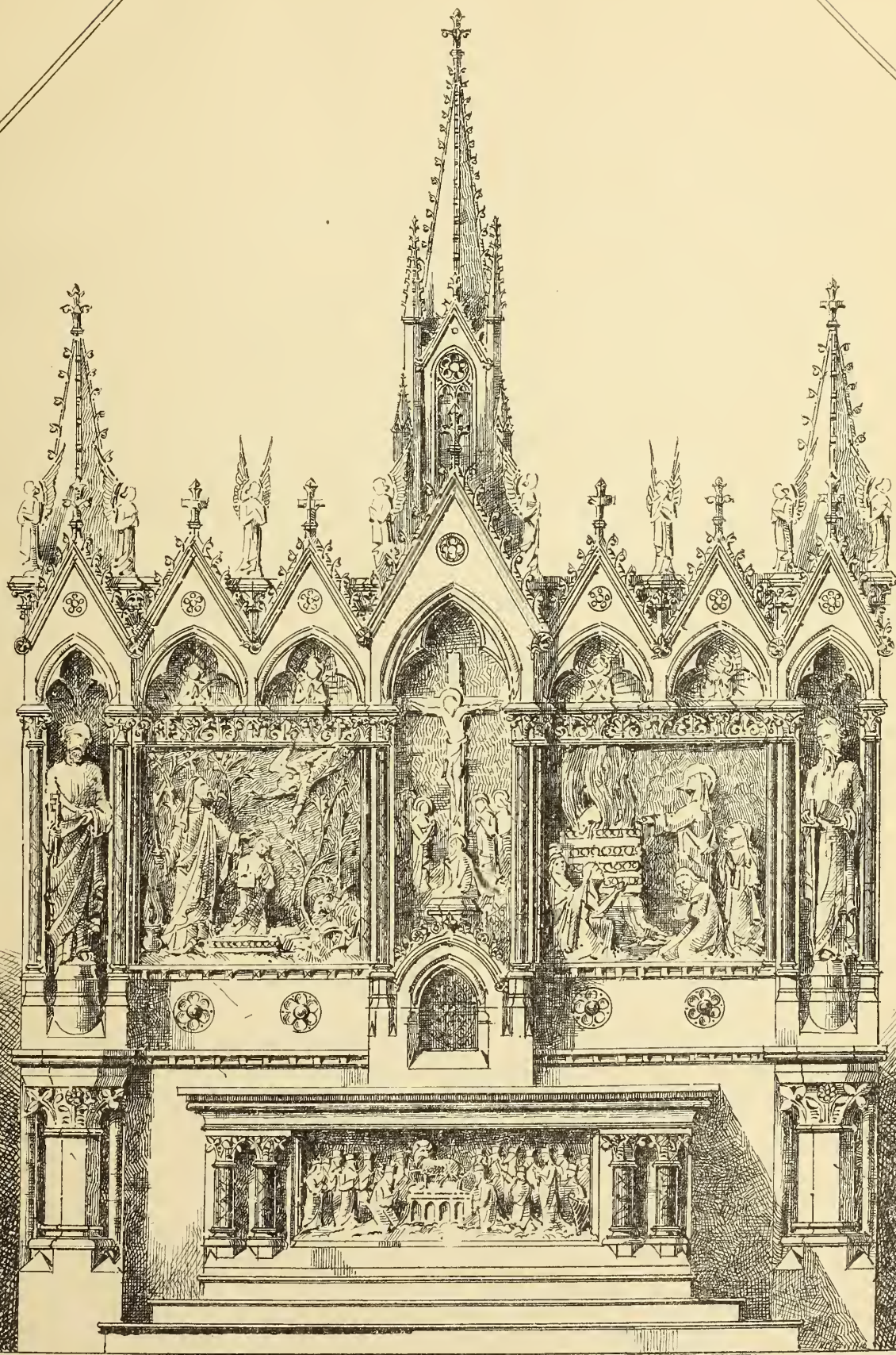
A correspondent writes:—"May I beg you to favour me with a definition of the terms 'right-handed' and 'left-handed' as applied to locks on doors? I find a difference of opinion among professional men upon the subject."

A lock which, when the bevel of the spring-catch is in front of the observer, shoots towards the right, is a "right-hand lock;" if it shoot towards the left, a "left-hand lock."

SIR,—In answer to your correspondent, the bolt of a right-hand lock always shoots from left to right, and a left-hand lock from right to left, as you stand on the outside of the door. Mistakes with respect to the hand of locks are of daily occurrence. What the carpenter calls a right-hand lock, the locksmith calls a left-hand, and *vice versa*. Standing on the outside of the door, and locking the lock by turning the key in the right-hand locks to the right, and in the left-hand locks to the left. If the bolt comes out to the left it is a left-hand lock; if to the right it is a right-hand lock: the bevel of the latch-bolt will be towards you. This is the locksmith's rule. It may be well to notice that for a closet in a room in which the door of the closet is constructed to pull towards you, if a rim-lock be required to be fixed on such a door so as to be inside the closet when the door is closed, the bolt or latch would require to be bevelled just the contrary way to the ordinary locks, as in closing you push the lock away from you instead of pulling it towards you. Such a lock is called by locksmiths a reverse bolt lock, and it requires to be fitted with a striking-plate for the door-case instead of ordinary box staple of the other locks. If the knob or the keyhole is required to be any particular distance from the edge of the door, always measure from it to the centre of spindle-hole and the centre of keyhole respectively.

In ordering locks, never run down the price, because whatever reduction you may get from the regular and fair price is certain to be made out to you in so much less security, so much less strength, and so much less finish. By the adoption of such a system, however much you may think you have saved, the maker will have got more, as there is always more profit in proportion attending the manufacture of a common article than one of a superior quality.

To illustrate this fact we may state a circumstance which is of frequent occurrence. A small manufacturer takes a pattern of a certain sized lock to the wholesale buyer, and names a certain price per dozen; this pattern is kept by the dealer, and on another maker calling, the pattern is produced, and the latter maker's price is asked for a similar article. The first, perhaps, was low enough, but the second maker's is still lower; an order with the pattern is given to him, and he sends the several parts to the brass-founder to be cast from. The locks are made and delivered, and the second maker has made quite as much profit out of the reduced price as the first maker would have got from the higher price; and this arises from the circumstance that the limbs which formed the lock having been cast from the limbs of the pattern lock were, after dressing, so much less in size, and consequently so much less in weight. By this mode 3-inch till locks in time measure but 2½ in., and all the parts are light in proportion. Whenever the grinding "system" is adopted, the work in the language of the workshop is "devilled" just in the same ratio. We believe this holds good in every other trade. CHARLES AUBIN.



15-9

NEW HIGH ALTAR OF CATHOLIC CHURCH AT BALLYRACCEFF, CO. DUBLIN. A. R. C.

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ANTIQUITIES ON ARANMORE,
BAY OF GALWAY.*

IARARNA is the extreme southern part of Killeany, one of the six townlands into which the island of Aranmore, in Galway Bay, is divided. The south-eastern portion of this "Quarter" lies low and flat, and protrudes out some distance in the sea, opposite to Straw Island. Some twenty or thirty years ago it formed, for the most part, one level plain of sand, of from 10 to 15 feet in height. Since then, the sand has been almost all swept by the winds into the sea, and the limestone rock on which it rested left bare. In consequence of this denudation, several objects of great antiquarian interest have been disclosed, which, up to that period, were unknown to exist there. These ancient remains, so lately revealed to view, are very curious, and deserve attention—not from any novelty of construction, size, or shape, as there are several of exactly the same description scattered in different parts of the island—so much as from the fact of their having been built on the solid rock beneath the large sand-plain, which completely covered them to the extent of several feet above their highest parts.

These ancient remains consist of—1st. Two clocháns; 2nd. Several double stone-wall fences, some of them running through part of Traighmhór, while others terminate at the very water's brink, and seem to have extended outwards under the sea; and 3rd. A structure formed of flags placed on edge, and corresponding in size and make with the flag-cells on the islands usually denominated Dermot's and Graine's beds.

Captain Rowan, of Belmont, Tralee, while on a visit here in the summer, took a lively interest in these relics of by-gone ages—had the clocháns cleared out of the sand and debris filling them, and during the process of excavation uncovered some human bones and an entire skeleton, which will be referred to hereafter. He also sketched the clocháns, and mapped out the locality in which they lie, together with the stone walls and "bed"—thus, from the plates lithographed from his sketches, and accompanying this paper, enabling the eye to take in with a glance the features of the place, and the position the old remains occupy.

A few preliminary observations, however, on the whole district, may not be deemed unnecessary here, as Captain Rowan's map only illustrates the portion on which the remains are found.

The east side of the three islands of Aran contains several extensive sand-plains, and may have been in former ages one continuous and unbroken sea shore. At Kilmurvy there is one; another in the village of Monaster; Kilronan comes next; and to it succeeds the one at Iarárna. Passing over Gregory's Sound, we find a large portion of the middle island near the sea almost composed of sand; crossing again the Foul Sound from Sand-head, we arrive at Innis Saor, and find the sand occupying the entire sea border, and extending some distance along the Sound, between it and the Clare coast.

It is allowable to conjecture that the sand in all these places was deposited at one and the same time. The old remains found under the sand of Iarárna lead us to suppose they must have been erected anterior to that period. It is, no doubt, difficult to understand how this can be, as the clocháns and fences seem to be comparatively modern. The "bed," it is true, belongs to more ancient times, being connected, as many suppose, with the mythology of the Pagan Irish. This, however, only brings us back to the second or third century of the Christian era; but unless some more plausible way can be found for accounting for the accumulation of sand over these ancient structures, it must be referred to a date posterior to their erection.

Iarárna comprises the southern extremity of the towland of Killeany. The Glassen

rocks lie to the south, at the entrance of Gregory's Sound. These are horizontal table-rocks about 20 feet above the sea level, from which the superincumbent strata of limestone have been detached and washed away, to the depth of 14 feet, by the action of the sea, thus leaving a perfectly level and smooth platform of great extent on the sea-side margin of the cliff. This natural *promenade* has been much frequented by visitors—many of whose initials and names are incised on the smooth faces of the vertical rocks on the land side. In the spring and summer months, old men, now too feeble to battle with the elements and work the light canoe in either calm or storm, and young boys, as yet unpractised to handle the frail oar, resort here in numbers, and, with either hand-lines, or rods of seasoned saw, fish from the brink of the rocky platform. In certain seasons the "take" is abundant; and they not only supply their own families, but have some for sale.

The Glassen rocks receive their name from the large quantities of "pollock" usually caught there. Its Irish name is "Ail na n-glasóg," or "glassán," from whence also is derived its English appellation.

South-west of the Glassen rocks are two large puffing holes, through which, when the wind blows from the west, with the least stir in the sea, the waters seethe and rush upwards as if from some huge caldron, and with terrific roar cast their white foam and thick clouds of spray aloft.

Passing along towards the village of Iarárna, the island rises up in a ridge-like shape, from whence we obtain a full and complete view of the picturesque and grand but stern scenery by which we are surrounded. In the distance, far off seaward, are the Brandon hills, whose outlines are faintly discernible through the light hazy mantle of bewitching blue with which they are enveloped. Our glance next rests on the cliffs of Mohar, raising their lofty heads in solemn, silent and majestic grandeur. Then we gaze for a moment on the Clare coast, until the eye rests on the summits of grey Ceannbóinne (Black head), which often, of a summer's eve, when the sun is about to sink to rest, is lit up with a magic splendour and golden glory of such gorgeous beauty as words cannot express. Then right before us is Galway bay, surrounded by the Connemara hills, which, like towering giants, rise in the far off distance. Their rugged sides and summits are bathed in a soft, bewitching haze of purple; distance lends a dreamy softness to their giant forms, and the light vapoury mantle in which they are enshrouded mellow down the sternness with which a nearer view might invest them.

The little village of Iarárna is situated low down on the eastern face of the declivity, on the brink of the sand-plain. It boasts of no great antiquity. Two or three generations, at the most, have only passed since the first cottage was reared there. It is marked on the Ordnance Map as "Eararna." The natives, however, always pronounce it "Iarárna," with the first syllable sounded as "ear," in the sentence, "ear of corn," &c. Its meaning is, "the hinder part, or extremity of Aran." "Ear" and Iar, in compounds are synonymous, as we gather from the word "earball" = "iarball," compounded of "ear and ball," the extreme member, literally "tail." The two last syllables "arna" of this word are an abbreviated form of the genitive case of "Ara," a feminine noun of the third declension whose regular genitive would be, "Arána," meaning "the Aran isle."

We now advance onward by the side of Gregory's Sound, and arrive at the site of "Teampol na m-Brathar" (tsampul ná mrawar), as marked in the Ordnance Map, of which not a vestige now remains. From this we proceed a short distance eastward until we meet "Port-Deha;" and here we must pause a while, as there is a legend connected with this little indentation, which deserves some attention.

Port Deha is a little hollow, or bight, of a rather rough and stormy character, but at the same time exceedingly beneficial, as large

masses of seaweed enter there; and the hardy islanders combat the huge billows, struggling to rescue this useful commodity from their fierce grasp.

The Irish language has four terms expressive of different kinds of sand beach, or collections of sand. Traigh (Tráw) indicates the part between high and low water mark. Cladach commences at high water mark, and reaches from thence to the Dúirling, where it terminates. Dúirling is the ridge or summit above this, generally covered with water-worn stones. Dubhach (doo-ach) follows it, and is the name usually given to flat plains of sand, whether of great or small extent, but never approached by the tide. In these islands "Dubhach" is seldom employed, and Gúaradh (goo-ráh) is used instead; but this word properly means any detached or isolated sand bank; especially such a one as may be acted on or scattered by the wind.

Thus, we see there is but slight difference between the two words "dubhach" and "dabhach:" in rapid pronunciation this is scarcely noticeable, and in the genitive case, in which each word would be used in conjunction with "Port," still less so, as both belong to the same declension and gender. From this it might be conjectured that "dabhach," "tub or vat," is only a corruption of "dubhach," "a sand plain," a name which exactly and truthfully expresses the characteristics of the locality in which this little beach of "Port-doibhche" was situated, and surrounded as it was by one level, extensive, and then unbroken plain of sand.

The mistake thus originated may have led on some fertile imagination to account for this singular appellation, and thus the legend of the miraculous transport of the "dabhach," "vat or tun," may have been invented.

A little to the east of this, again, we come to another small rocky beach, called by the natives "Cala na luinge," "ship harbour or cove." A tradition, but of comparatively recent date, is also connected with this place. It will be noticed shortly; but now we have reached the spot where the relics of by-gone days commence, and so we turn our attention to the most prominent, if not the most interesting of these remains.

The clocháns are two in number, and lie within a few hundred yards north of Cala-na-luinge. At a little distance they appear like two large mounds of loose, disjointed stones, half buried in sand; but on a nearer survey something like order, though of a very rugged and rude character, begins to be perceived, but it is not until we really stand upon the summit of the one nearest the Sound that it could be identified as one of those ancient structures denominated clocháns. The rounded, or beehive-shaped roof, as it is called, then becomes apparent. When the writer first saw it a few years ago, the greater part of this building was imbedded in the sand, nothing of it being visible except a few of the topmost courses of light flags forming part of the roof, and the horizontal ones stretched across the top, and covering all in. The lie of the stones, and the formation of the roof, however, proclaimed the character of the building. The second clochán is only distant a few yards from the first, lying in a straight line to the north of it. Externally it only presents a mass of ruins imbedded in sand with loose stones scattered over it. On the top, in the centre, lies a heavy slab of limestone, which, although rude, shows evident signs of having undergone some preparation in order to fit it out as a tombstone, for which purpose it was evidently designed, and also used to point out the spot where some lone stranger found his last resting-place. Round about this mound several small headstones are apparently observable. On the south-east side are two smaller ones of that description, placed, one at the head and the other at the foot of a grave. This clochán, as already remarked, is in ruins. The reason of its greater dilapidation may be accounted for by the following tradition still preserved amongst the islanders. It was related to the writer by a villager of Iarárne about fifty years of age, who stated, that he

* By Rev. William Kilbride. Read at Meeting of the Historical and Archaeological Association of Ireland, and published in their "Journal," 3rd series, No. 3.

often heard his father (who died upwards of eighty years of age) mentioning it as a tradition received from his father, and often spoken of amongst them as having happened before his time; so that the occurrence to which it refers may date, perhaps, from one hundred to one hundred and fifty years back, and is as follows:—A Spanish (some say French) ship was driven into Cala-na-luinge (whether from stress of weather, or any other cause, is not remembered), and all on board were lost. The bodies were washed ashore; but the islanders have been, it seems, ever averse to inter strangers, and especially shipwrecked ones, in their own burial grounds. Being, however, unwilling to deny them the rite of sepulture, they resolved to bury them in the great sand plain around them, and for this purpose opened the graves accidentally over the spot where the clochán lay entombed beneath the sand. They never imagined for a moment that a building of any description lay underneath; for the sand plain was at the time several feet higher than the tops of the clocháns. In digging down, they, however, disturbed the roof, which must have fallen inwards, and also the side walls, from which cause the building, when the sand was drifted by the wind from it about fifteen years ago, was found in ruins, a mere mass of loose stones imbedded in sand.

That this tradition is in the main correct there is now little or no room for doubt. Captain Rowan, while investigating the place, collected several detached human bones; and in the spot marked by the two upright stones already mentioned discovered an entire skeleton. Had the search been mainly directed to that purpose, or further continued, others might have been obtained; but sufficient proof was supplied, in what was found, of the truth of the story, without further search.

Two important facts, however, and of the greatest interest with respect to this locality, are furnished by the above long-remembered tradition. In the first, we see that the sand formed one great plain of from 10 to 15 feet in height, rising as it did when those bodies were interred there, several feet above the highest tops of the clocháns. The dilapidated state of the one in which they were buried, together with the tombstone now lying on its summit, fully attest this. The second is, that it is only within the past twenty years the sand forming this extensive plain has been swept away. Within this period, not only the clocháns, but also the other remains have been uncovered, and become objects of observation. Before that time they were entirely hid from view, entombed beneath the sand, and consequently unseen and unknown.

On September 7, 1867, Mr. Thompson, of 95, Leeson-street, Dublin, and Capt. Rowan, determined upon having the clochán nearest Cala-na-luinge excavated. To effect this, men were employed to clear out the sand with which it was filled; but during the process some of the top stones, when deprived of this support, fell in. Nothing but sand was found in the interior, which, when emptied, proved to be more capacious than what might have been expected from its external appearance. Its foundation rests on the solid rock, and is of a quadrangular shape on the inside, which form is retained until it reaches the height of 4 feet, when the beehive-shaped roof commences. It measures 8 feet 2 inches by 8 feet 9 inches, and 8 feet in height. It had neither chimney to emit the smoke, nor window to admit light. The door or entrance was narrow, being only 1 foot 7 inches in breadth; the jambs were, however, perpendicular, and without that incline inward at top so observable in the other ancient buildings on the islands; they are also pretty well built, and the different courses of masonry are far more regular, and of a better construction than usually met with in clocháns. From the door there is a narrow passage 3 feet 6 inches in breadth (except in one spot where it widens out to 4 feet 7 inches, in order to include a large boulder), leading outward, and enclosed by walls well built, of about 3 feet 6 inches in height. At the termination

of this are six steps; the topmost one on a level with the side walls of the passage, thus forming an enclosure or alley, erected, no doubt, for the double purpose of a protection from the winds and storm, and also from the drift sand. The steps lead us to suppose the latter was the principal enemy to be guarded against. Outside this passage, through its whole length on each side, are piled large heaps of stones, as if forming an exterior defence.

From the west and east corners of this clochán a large circle of loose stones commences, which includes the second clochán within its circumference, but in close proximity to its northern extremity. This circle, which was doubtless intended for a defensive enclosure, in the same manner as the passage leading up to the first one, was 72 feet in diameter. From the position of the two clocháns, and the circle surrounding them, taking in what may be called the back wall of the first one as part of the enclosure, it may be reasonably conjectured that they formed one establishment, connected by a covered passage with each other, as may be seen in some of the clocháns near the village of Cowrogh, where there is a whole assemblage of these buildings forming a little town, not inaptly called "Baile-na-Seán," or town of the ancient ones, which has been, until the present year, left unnoticed, not having been even marked on the Ordnance Map.

The late Dr. Petrie, in his elaborate work on the "Round Towers," when describing these remarkable and curious structures, informs us that the Pagan clocháns differ in two material characteristics from the Christian ones. The former were round or oval in shape, and always without cement, while the latter deviated from that type, assumed the rectangular, at least at their base, and gradually introduced cement. It is to be feared this rule, at least with respect to their form of construction, will not hold good in these islands. The various stone cells surrounding the old fortress of "Dubh-chathair," although not covered in with the beehive-shaped roofs adopted in the formation of clocháns, are, however, esteemed as the most ancient of such habitations in the islands, yet they are one and all invariably rectangular. If Dr. Petrie's theory, however, be correct, these Iarána clocháns are undoubtedly of Christian origin; and if the masonry of which they are composed is taken into consideration, they belong to more recent times than most of the others. If such be the fact, how can the accumulation of the vast plain of sand, not only surrounding them, but rising several feet above their summits, be accounted for? From whence, and by what agency was it driven there? To say the sand was excavated until the rock was reached on which their foundations were placed will not solve the difficulty, as we find the sand completely covering them to the extent of several feet. The boundary fences, hereafter to be referred to, were covered up in the same way: they can be easily traced out, some entirely denuded of sand, others only a few inches above it, and these can be tracked in their progress until they entirely disappear underneath it. Then, again, we have the mortuary chapel of Endeus, beneath which it is said 125 bodies of saints are interred, built on the surface of the sand plain, from 10 to 15 feet above the rock. This example before the eyes of the builders of the clocháns might lead us to suppose that if the sand existed there at the time of their erection, they would scarcely have undergone so much labour as to sink down to the solid rock merely to erect a clochán.

(To be continued.)

PLAN FOR THE PURCHASE OF THE IRISH RAILWAYS.

The following plan for accomplishing the purchase of the Railways of Ireland was submitted by Mr. Blake, M.P., to public meetings lately held at Waterford and Limerick for the purpose of adopting measures to forward that object:—

It now became a question—from the advantages certain to result to Ireland—how the transfer of the railways to the State was to be accomplished. The commissioners showed that the first year after commencing to work at reduced rates, that there would be a deficiency of over half a million sterling; this diminished yearly, until a turn the other way would take place on the twelfth year, when there would be a profit of £50,000; and on the thirteenth year, £90,000; and so, it was to be supposed, it would go on until there would be a good profit over expenses. On a conjecture as to the calculation of the commissioners, he supposed the annual loss would decrease by £50,000 a year—this would leave £525,000 to meet the first year, and £25,000 on the eleventh, or last year, before actual profits began. How was the deficit up to this point to be paid was the important question. He believed the advantages to Ireland would be so great, that if the object could be gained in no other way than by meeting the loss out of Irish resources, it would be worth their doing so. Many, however, would protest against paying the full annual deficit out of income tax, as it would amount the first year to nearly 6d. in the £, on the calculation that every penny on income in Ireland realized £100,000. (The income tax raised in Ireland, at 4d. per £, in 1867, was £356,431; it is not, therefore, too much to estimate for the future the slight increase which would raise this amount to £400,000.) He was one of those who would object to this course; but it need not be resorted to, unless in a form so mild as not to be likely to be objected to. The annual deficit could be borrowed by Government, and the interest on it charged to Ireland. The first year the interest would amount on £525,000 to £18,375; and on the eleventh, or last, on £3,025,000 to £93,324. An income tax of less than 1d. in the £ would meet this, as the first year there would be a surplus of £81,625 over the £18,375 required; but, of course, every year a larger amount would be requisite. In the end there would be a sum due by Ireland of £2,660,000. On the showing of the commissioners, the interest on this, would be met by the profits from the railways; and, probably, there would be some margin, too, for a sinking fund for gradually reducing the £2,660,000. The commissioners stated that "the public using the railways would pay for such increased traffic, during a period of twelve years, £12,000,000 less than they would pay for such traffic at the existing rates." Now all he contemplated that Ireland would have to pay for this advantage for the twelve years, was less than £1,000,000; so that Ireland in that time would be a clear gainer of £11,000,000; having, at the same time, paid her own way and asked England for nothing. This would not only be the most independent way of doing it, but it would also be the one most likely to succeed, as great opposition would be offered if it was sought to put the matter on the consolidated fund. It would also probably in the end save Ireland more money than if England and Scotland contributed their share; as in such event Ireland could not refuse hereafter, if it was proposed that Government should buy the other railways of the kingdom, to contribute her quota of the loss, which would be far beyond what she would have to pay for the first loss on her own railways. He, therefore, was strongly of opinion that it was best, in every point of view, for the Irish members to ask for no Imperial aid, so far as imposing anything on the English tax payers. The sum Ireland would have to pay was very trifling, when the enormous advantages which would result to the country were considered.

	Annual Deficiency.	Accrued Deficiency.	Annual Charge.	Surplus left at close of each year from levy of 1d. Income Tax, after charging net deficit with 34 per cent. interest rate
First year.	£ 525,000	£ 525,000	£ 18,375	£ 81,625
Second do.	475,000	1,000,000	32,143	149,482
Third do.	425,000	1,425,000	44,643	204,839
Fourth do.	375,000	1,800,000	55,830	249,009
Fifth do.	325,000	2,125,000	65,639	283,350
Sixth do.	275,000	2,400,000	74,082	309,268
Seventh do.	225,000	2,625,000	81,060	328,218
Eighth do.	175,000	2,800,000	86,512	341,706
Ninth do.	125,000	2,925,000	90,415	351,291
Tenth do.	75,000	3,000,000	92,705	358,586
Eleventh	25,000	3,025,000	93,324	365,262

It will be seen that at the commencement of the twelfth year there will be an accrued deficiency of £3,025,000, to be lessened, however, by the income tax surplus balance, as shown above, of £365,262—virtually making the net debt due by Ireland £2,660,000.

The Commissioners state that on the twelfth year there would be a profit of £50,000, and on the thirteenth, £90,000.—

ON FALSE COINING.*

WE shall attempt to throw some light upon a species of crime which probably came into existence almost simultaneously with the introduction of coined money, and which is practised largely at present: it is that of false or counterfeit coining. In the early and comparatively barbarous periods of English history, it was thought necessary to make the coinage of this country almost a sacred institution, and to protect it from violation by sanguinary laws. Under the Anglo-Saxon régime, for example, he who attempted to commit fraud by counterfeiting the coins of the realm was, if detected, condemned to lose the hand by which the crime was perpetrated. To this frightful punishment the cruel and dreadful policy of the Anglo-Norman monarchs added loss of sight and emasculation.

Fortunately the progress of civilization has caused the gradual mitigation of these shocking penalties, although it has not annihilated the crime for which they were inflicted. Down to a recent date false coining was treated as high treason, and death punishments were inflicted upon those found guilty of practising it. As stated recently in an article which appeared in these pages, On Ancient Modes of Coining, the last execution for counterfeiting the money of the realm took place in 1827.

Without entering minutely into the numerous alterations and modifications which at various intervals in the annals of Great Britain have been made and effected in the laws for the preservation of the coinage, we may briefly cite the main points of some of those changes. Sir William Blackstone, in his well-known "Commentaries," thus enumerates or summarizes these. It will be seen that the defacement and depreciation, as well as the imitation of legal money, were dealt with severely. He states that by statute 6 and 7 William III. c. 17, if any person buys or sells, or knowingly has in his custody, any clippings or filings of the king's coin, he shall forfeit the same and also £500; one moiety to the king and the other to the informer, and be branded on the cheek with the letter R (signifying not Rex, but rogue). By a later statute of the same monarch it was ordained that if any person shall blanch or whiten copper, or buy or sell any malleable composition which shall be heavier than silver, and look, touch, and wear like gold, but be beneath the standard; or if any person shall receive or pay any counterfeit or diminished milled (*i. e.*, remilled) money of this kingdom, at a less rate than it shall import to be of (which demonstrates a consciousness of its baseness, and therefore a fraudulent design), all such persons shall be held guilty of felony.

These precautions not being found sufficient to prevent the uttering of false or diminished money, it was enacted by statute 15 and 16 George II. c. 28, that if any person shall utter or tender in payment any counterfeit coin, knowing it to be so, he shall for the first offence be imprisoned six months, and find sureties for his good behaviour for six months more; for the second offence he shall be imprisoned for two years, and find sureties for six months more; for the third offence he shall be held guilty of felony, without benefit of clergy. Also if a person knowingly tenders in payment any counterfeit money, and at the time has more in his custody; or shall within ten days after knowingly tender other false money, he shall be deemed a common utterer of counterfeit money, and shall for the first offence be imprisoned one year, and find sureties for his good behaviour for two years longer; and for the second be guilty of felony, without benefit of clergy.

These and other statutes of a like nature have, however, proved to be at all times inadequate to the protection of the coinage. The censures of the church have been alike disregarded. As early as the year 1123 counterfeiters of the state money, and also the circulators of base coin, were declared by the Council of Lateran to be accursed, oppressors of the poor, disturbers of the state, and ex-

communicated. Still these crimes prevailed. About 1560-61 false coining appears to have reached its maximum point in this country. At that time a great recoinage took place, and it is on record that of 631,950 pounds of money then called in and recoined, only 214,416 pounds of "fine monies" could be produced, whilst the dross of this mass of metal was so great in bulk as to have been carried to foul highways and byeways where rubbish might be shot. In fact the bulk of waste in this recoinage was enormous, for the difference of weight of the metal as originally sent to the mint and when reduced to standard was 387,534 pounds.

A strange tale is told, too, of the workmen engaged in melting down the good and the counterfeit coins. Most of them fell sick to death through inhaling the noxious fumes of the metal. As illustrative of the skill of the medical men of the period, it may be mentioned that the prescription for the cure of the poor fellows was to the effect, that they should drink water from dead men's skulls. In accordance with this delightful suggestion, a warrant was actually procured from the council, composed of persons as enlightened as the doctors, to take off the heads of traitors and criminals which had been placed on London Bridge and make drinking cups of them. It is reported that some of the invalids found relief from the operation, "although most of them died." It is probable that the sickness arose from arsenious acid given off by the spurious metals; but there can be no doubt as to the wisdom of the remedy applied for its cure.

To this hour the nefarious practice of illegitimate money-making has gone on without intermission. It is known, indeed, that many hundreds of persons in England obtain a livelihood by it, and tradesmen and others are their constant victims. The annual cost of prosecutions for this class of offence is not less at present than £10,000, and yet many of its perpetrators escape. The percentage of acquittals in proportion to convictions is very large. The meshes of the legal net for catching such offenders seem somehow to be too large, as shoals of false coiners annually slip through them to prey again upon honest members of the community.

One curious fact may be mentioned in regard to coinage offences, and that is the fluctuation in their number in different years and at different seasons of the year. It is well known to the officers of the solicitor's department of the royal mint that during a general depression of trade, and when destitution prevails extensively in consequence, they have the greatest amount of duty to perform. The business of the office in question resembles in fact a kind of social barometer. If destitution be rife among what are known as the lower classes of the population, prosecutions for false coining are numerous, and *vice versa*. Before the repeal of the hateful corn laws the cases of criminal trials for the crime in question fluctuated with the price of the quartern loaf. When bread was "down," the solicitors to the mint had comparatively nothing to do. When it was "up," they were overwhelmed with work.

The year 1843 was a remarkable one in respect of prosecutions for coining and uttering base money. The number of persons then convicted of one or other of these offences throughout the country amounted to 400. In that year the poor suffered many privations, and destitution existed to a dreadful extent.

The winter season again is peculiarly favorable to the development of the crimes of false coining and uttering. They are always more numerous as the weather becomes more inclement. The examinations of persons so charged before police magistrates are always excessive in number when the thermometer is down to or below the freezing point. It is supposed, and with very good reason, the facilities for gaining an honest living are greater in the summer time than in the winter, and that during the latter period the crime is resorted to more from (what is considered) necessity than from choice. In the dark days of winter, too, there are no doubt better

opportunities for passing bad money than in the bright sunshine of mid-summer.

These facts are remarkable, and they are introduced here for the purpose of suggesting to the philanthropist and to a humane legislature the direction in which to work for its removal. Sanguinary and deterrent laws have not checked false coining. It remains to be seen whether a milder administration of justice, and a more enlightened consideration of the causes for crime, may not have the desired effect of suggesting truer remedies. If the statistic data just furnished, and which is but an abstract of what might be produced, indicates the origin of one of the evils of our social system, and should lead those in authority to a further consideration of them, the writer will have gained one point which he had in view. We may thus draw in this, as we might do in many another analogous case, the sad conclusion that it is not any inherent love of crime, but want, that is its origin—want, itself the consequence almost always of ignorance: for knowledge is power, and power bread. What then is the lesson? here again it is, Education.

Although, for the most part, false coining is practised on a small scale and on individual responsibility, yet it is not very many years since what might be called a coining company existed in Birmingham, and it comprised men of intelligence and ingenuity. They pursued the art of money-making on a very systematic and extensive scale, and the article they produced, having been struck from well engraved dies, bore a remarkable similitude to that issued from the government establishment. By dint of great vigilance on the part of the law officers of the mint, and some treachery on the part of certain members of the "company," the gigantic concern for cheating her Majesty's lieges was broken up, and its promoters were subsequently transported. It is not probable that any such organization exists at present in this country. False coining is a retail trade, but many persons are undoubtedly engaged in it. Vast numbers of florins of a spurious character are annually put into circulation, and the worn condition of a large proportion of our legitimate coinage, of shillings and sixpences especially, offers a temptation which is not lost sight of. Crowns and half-crowns, too, are frequently imitated, for almost all of these are being rapidly reduced to the uniformity of plain surfaces.

HISTORICAL AND ARCHÆOLOGICAL ASSOCIATION OF IRELAND.

WE continue our report of the proceedings at meeting of the above Society, held on the 13th ult. :—

Mr. F. Kelly informed the meeting of a discovery of ancient silver coins at a place called Tyroe, or Lacken, in the first week of November. He had made all inquiries as to the circumstances under which the discovery had been made. It appeared that some men were engaged in making drains in a field near an old rath, and when commencing the work an old man residing in the neighbourhood told them they would be sure to find money there, from which circumstance it might be supposed there was some tradition in the locality of its being a place in which treasure had been hidden. Be this at it might, in the course of making one of the trenches, under a flat, heavy stone, what was variously called a crock, a box, and a leather bag, of silver coins was lighted upon and broken by the spade. One of the finders described the covering of the coins as being of an oval form, as if it had been a thick skin of leather in which the money had been wrapped. He had procured a small portion of the material from the man, which resembled a thin piece of wood, but possibly might have been a thick skin of leather much changed in its appearance by long lying in the clay. The greater number of the coins were small, not larger than the present silver fourpenny; while some were of the size of a florin, but much thinner. Altogether it was stated there were about fifty coins, but there

* From the *Practical Mechanic's Journal* for present month.

might have been much more, as it was difficult to get any definite information on that subject. It was stated that the proprietor of the farm had obtained all the coins from the workmen, except a few which had been handed about or otherwise disposed of on the immediate occurrence of the discovery. He begged to present one of the coins, which he had obtained.

The coin presented by Mr. Kelly, as well as another of those found on the occasion, and sent to Mr. Graves by Mr. Matthew Doyle, New Ross, and a third given to Mr. Prim by Mr. Macnamara, Kilkenny, were silver pennies of Edward III. The three coins, however, were minted in different towns. Mr. Kelly kindly promised to make a further investigation into the circumstances of the discovery.

ST. PATRICK'S GATE.

Mr. Prim remarked that the circumstance of the Association's new apartments, in which they met for the first time this day, being situated adjoining the last remaining gate-tower of Kilkenny, was calculated to give that relic of the old mural defences of the city some additional interest in the eyes of the members. A discovery had just been made in connection with St. Patrick's gate, by Dr. James, which was, perhaps, worth noticing under the circumstances, although not archaeologically very important or interesting. In making some alterations in Butler House, at that portion adjoining the gate, the mason employed accidentally struck the back of a shallow recess which had contained shelves and seemed to have been used as a press. From the sound he guessed that there must be a hollow place behind, which appeared strange, as it seemed to be built against the solid gate pier. Curiosity led him to remove some of the single-brick partition backing this recess, and it then was found that there was a kind of chamber in the gate-pier. Dr. James communicated the circumstance to him (Mr. Prim) and he examined it. There had been an impression very prevalent in Kilkenny that originally a small passage, as a kind of postern for foot-passengers, ran through the gate-tower, at the side of the gate-way, which had, however, been walled up at some time or other. The reasons for this idea being held were, that the gateway arch is not central, the pier supporting the structure above it being much wider at one side than the other, and that in this wider pier, facing towards Patrick-street there are marks visible in the masonry having the appearance of an old aperture modernly built up. Under these circumstances he had immediately concluded that Dr. James' mason had, on removing the brickwork at the back of the press, found a way into the supposed postern passage, from the side. However, on examining the premises, he found such was not the case, and obtained the fullest evidence that no such side-passage or postern entry had ever existed in the gate-tower. The aperture which the mason had broken into, was a small rude chamber, which had been at some time scooped out of the thickness of the tower-wall. It was quite uneven in its shape, capable of containing six or eight persons, who in some places might stand erect, but in others could not do so, the roof and floor being most irregular, as were also the sides. In fact the hole was quarried into the wall of the gate-tower in the roughest manner. There were, however, some indications of an attempt to render the sides and floor in some degree even, by plastering them with mud. There was no provision either for light or air in the hole, so that it could not be conceived to have been used as a hiding place by any human being; but it might have been constructed as a place of concealment for valuable property; and it could scarcely have been formed thus, having a communication through the back of the press from the Butler house premises, much earlier than the middle of last century, as Roque's map of Kilkenny seemed to show a vacant space between St. Patrick's gate and the house; and the portion of the latter now joining to

the gate therefore could not have been built till after the survey was laid down. The only feature of interest which was presented by the interior of the hole, was with respect to one of the stones forming its rude flooring, and which was an undisturbed building stone used in the erection of the base of the gate-tower. This was an old "heel-stone" in which a gate had swung for many years, as the orifice to receive the rounded end of the gate-beam, in hinge form, was much worn, and rather oval in its shape, from use, apparently having been originally circular in its form. It puzzled him at first to understand how this well-worn "heel-stone" had come to be in a position where no gate could swing in it—in fact in the middle of what had evidently been a solid mass of masonry. But this was fully explained, when the history of the structure came to be considered. The present building is not the original gate-tower of St. Patrick's, but one substituted therefor in the seventeenth century. The old tower, which doubtless had more the appearance of a fortification than the present, had been taken down about the year 1620 and gave place to the present half-house half-castle structure, with gables, but evidently, from the coin-stones remaining, having been, when first built, provided with two pepper-box turrets at the upper angles of the outside face, like the angle turrets on the Castle of Kilclue, near Beunettsbridge. The hinge or "heel-stone" referred to, doubtless had belonged to the original gate-tower, and when the latter was thrown down, and the new tower built, this stone was used as a piece of ordinary building material by the masons. The architectural features of the present St. Patrick's-gate gave sufficient evidence of its not having been the original mural port and defence here; but there was full corroborative testimony in one of the old leases preserved amongst the municipal records in custody of the town clerk. This was a lease executed by the Corporation of Kilkenny on the 16th of January, 1620, to Richard Roth Fitz Edward, of "the castle over St. Patrick's Gate, with the appurtenances, for the term and to the end of a hundred and out years from the feast of Easter next, the said Richard, his executors and assigns enjoying the same for the first two years rent free, and thence after yearly paying during the remainder of the term, the sum of 10s. per annum to the Corporation." It was covenanted that the tenant should, within a year from the time of entry on tenancy, "break down the walls of said Castle, and adjoining ditch, and build and make it up again sufficiently with lime and stone, and furnish the same with good stone windows, make and erect two good punnions (gables) over the same, and shall make the said work two stories in height over the said gate, and make and erect a good chimney in one of the said stories, for the watcht of the said citie, and also shall, in one year following, build and erect the vault of the said castle in such sorte as it has been before, or, at his election, make up the floors (floors) of the said stories with good oaken joists and oaken planks, and roof the said castle with oaken timber and laths, and cover the same with slates; or else the said lease to be voyde." The gate tower, as it at present existed, showed that this contract had been carried out. The height of the building was increased to three stories above the gate, instead of the two at first agreed upon; some of the stipulated stone frames of the windows of the period were still visible; a chimney had been constructed in each of the "punnions" or gables, and the tenant had made the election allowed to him, of not constructing a vaulted covering to the gate passage, like the olden one, but had substituted the flooring over it with beams and planks of oak, as was still to be seen. None of the old embattled gate-towers of the City walls of Kilkenny had come down to the present century. This gate of St. Patrick's had been entirely rebuilt in the seventeenth century. St. James' Gate, altogether removed only a few years since, had been remodelled at a

much later period, but had preserved a remnant of the old building in the outer pointed archway; the inner arch, as it lately stood, having been comparatively modern. Beside the seventeenth-century gateway of St. Patrick's a portion only of one other of the old town gates still remains, in Lee's-lane, near the Black Abbey, the outer circular arch of what was known in the olden time as the Black Freren Gate-tower.

The papers brought before the meeting included a notice of the tradesmen's tokens of Carlow town and county, as far as they are known to exist, by Robert Malcomson, Esq., with illustrative drawings—Carlow town, five specimens, being those of John Masters (1657), Thomas Moore, Thomas Reynolds, Edward Reynolds, and Garrett Quigley; of Bagnalstown one, Walter Karney; and of Tullow one, Richard Burchall.

"On Ogham Inscribed Stones," by R. R. Brash, Esq., giving an account of two monuments in the county of Cork, one at Lindes, previously known for some time as being in existence, but the other, a new discovery, at Gurrane. A very beautiful illustrative drawing, by G. M. Atkinson, Esq., accompanied the communication.

A notice of the discovery of antiquities at Askeaton, and especially a bowl-shaped vessel of the chalice form, highly ornamented in particular with figures of the Apostles, whose names respectively are inscribed in letters of a character which show a Greek parentage; communicated by E. Clibborn, Esq.

"On the contents of a Sepulchre of the Bronze Period, in the county of Tyrone," by Thomas O'Gorman, Esq.

"On a Subterranean Chamber near Tra-more," by Dr. Palmer, Waterford.

The usual vote of thanks having been passed to donors and exhibitors, the Association adjourned till the first Wednesday in April.

EXCAVATIONS AT ROME.

THE British Archaeological Society of Rome has been very active of late in the Eternal City, where excavations are going on steadily. During the month of January a pit has been dug on the line of the wall of Servius Tullius, between the Cœlian and the Aventine; parts of the wall and of the aqueducts by the side of it have been exposed to view, and left open for the present. Another pit has been dug in the Circus Maximus, and a part of one of the galleries, with a staircase, brought to light; only the rough stone foundation remains, all the cut stone has been carried away. This pit has been filled up, but the surface of the stone remains exposed. Another excavation has been made in the sand on the bank of the Tiber, showing considerably more than was before visible of the Tufa wall, called "the Pulchrum Littus of the Kings." This is at the "Porta Leone," and exactly opposite the lions' heads of Etruscan character, in the cliff on the side of the river, at the upper end of the Port of Rome. The excavations made by the Baron Visconti are at the lower end of the Port. The lions' heads were discovered by Mr. Parker two or three years since. The proceedings of the Society have excited a good deal of attention and emulation. The Corporation of Rome has voted £600 for continuing the investigations of the Mamertine Prison in the Channel commenced by the Society. Three of the Roman Princes have combined for a like object, and commenced excavating another part of the wall of Servius Tullius, near the Railway Station. It is to be hoped that these proceedings will be as well directed as those of the British Society, which have already thrown considerable light on several vexed questions in the historical topography of Rome, especially the true sites of the Porta Capena, the principal chambers of the Mamertine Prison, the Lupercal of Augustus, and several reservoirs of the Aqueducts, previously unknown; also on the source of the Aqua Appia and Aqua Virgo, and to a considerable extent the line of their subterranean conduits. —*Athenæum*.

NOTES OF WORKS.

New watterooms are in course of erection in Thomas-street, for Messrs. Garratt and Co., opposite to those recently erected for Messrs. Wardell. They will contain extensive tea and sugar stores, cooperage, offices, &c. Mr. McCurdy is the architect; Messrs. Beckett, builders.

Messrs. John Egan and Co., of 82, Talbot-street, are commencing extensive alterations, and the addition of the house adjoining to their present premises, with new front, &c., under the direction of Mr. J. J. Lyons, architect.

Plans for a new Christian Brothers' school and residence, Doneraile, have been prepared by Mr. G. C. Ashlin, for the Very Rev. Dr. Croke, P.P., V.G., Doneraile; also enlargements and improvements to the chapel of Shanballymore, in the same parish.

Mr. Waterhouse, the eminent silversmith and jeweller, of Dame-street, is having extensive alterations and additions made to his warerooms; the adjoining premises, lately occupied by Mr. Leech, are to be thrown into and form a portion of the large showrooms, workshops, and offices that will be contained in the new establishment. Mr. M'Curdy is the architect.

Considerable improvements and additions to Ballynastragh House, Co. Wexford, for Sir John Esmonde, Bart., M.P., are about to be carried out. Mr. G. C. Ashlin, a chitect.

Two dwelling-houses, of neat character and commodious internal arrangements, are being built at Clonliffe, according to plans and specification furnished by Mr. Lyons, architect; Mr. Butterly, builder.

The new lecture-hall at Nenagh has just been completed and handed over to the building committee. It has been erected, as we have already stated, in the most central part of the town, facing the post-office. The site was given by Anthony Parker, Esq., of Castlelough. The cost was about £1,300. Mr. George Moyers, of South Richmond-street, was the contractor.

Messrs. Saunders, of Malden-road, London, have just erected three very handsome stained glass windows in the chancel of St. John's Church, Monkstown, Co. Dublin, as a thank-offering from a parishioner whose family narrowly escaped destruction in the Abergele accident. The windows reflect great credit on Messrs. Saunders. Mr. M'Curdy was the architect.

The new Berwick Wing, to be built to the Convalescent Home, Stillorgan, as a memorial to the late Judge Berwick, who met his death in the lamentable accident at Abergelle, is to be commenced forthwith. The works are to be competed for by a limited number of contractors. Mr. M'Curdy is the architect.

A new Catholic church is about being built at Barryroe, Co. Cork, for the Very Rev. Father Moloney, from Mr. Ashlin's designs. The church is of rather large proportions, and very plain and severe in style, and will be capable of containing a very large congregation at a comparatively small outlay. The quantities for this church are being supplied by Messrs. Gribbin and Cleere, surveyors, of Stephen's-green.

The house and premises No. 22, Bolton-street, Mr. Hastings proprietor, are being rebuilt, with new front added thereto. Mr. Lyons is the architect; Mr. Luke Doyle the builder.

MISCELLANEOUS.

THE NAVIGATION OF THE BARR.—We (*Coleraine Chronicle*) regret to state that a temporary stop has been put to the works at the mouth of the river. On Sunday morning last, Mr. Michell, the contractor, withdrew the whole plant from the scene of operations. The alleged reason is this—that he met with obstacles in the bed of the river which he did not calculate on, and now wants to rescind his contract, and enter into a new arrangement; and lest the commissioners would seize his machinery, which they had

the power of doing, and compel him to carry out the original agreement, he quietly stowed up all his moveable property, and, as already stated in the face of a terrible storm started for Lough Foyle on Sunday morning last, with the dredger, two tugs, barges, &c. Some of the barges sunk when they had crossed the bar, but the dredger, after being a day and a half at sea, is now lying at Derry quay pending negotiations, the result of which it is at present difficult to fore-see. This much, however, we may say, that the commissioners are determined the project shall not fail, if any effort of theirs can secure its success; and we hope to be in a position in a week or two to announce that the works have been resumed.

DRAINAGE OF LOUGH ERNE.—A daily journal of Saturday last has the following:—A meeting of the committee for the drainage of Lough Erne was held in the Court-house to-day: the Right Hon. the Earl of Erne, K.P., in the chair. There were also present:—The Hon. John Lowry Cole, Richard Hall, Esq; Rev. J. G. Porter, and others. The following motions were passed:—“Resolved—That Lord Erne be requested, when he goes to London, to *find out a competent engineer* to examine and report on any plans submitted to the committee in reference to the drainage of Lough Erne; also to *find out the expense* of making reports, &c.” Also, “That the Rev J. G. Porter, Mr. Smith, and Mr. Hall, be requested to *find out a competent valuator* of flooded lands, and to report on same; and to ascertain the expense of making such reports.”

DEATH-DEALING INVENTIONS.—A Tennessee mechanic has invented an instrument of warfare which, if it does half that is claimed for it, will prove more destructive than the needle gun. It consists of a range of guns of 0.76 bore and about 40 inches long, mounted on a carriage of very simple structure, to be hauled by one horse. The width of the carriage between the wheels is 6 feet. The gun barrels—twenty in number—are ranged apparently parallel, but divergent, so that at 300 yards distant the twelve bullets sweep a line of about 30 feet. They are ranged at equal distances from each other, except in the middle, where there is a space of 10 inches, into which is placed a telescope of considerable power, and a nice arrangement for adjusting the guns in taking aim. This contrivance enables the operator to send a bullet through the bull's eye at 1,600 yards nine times out of ten. The tubes or barrels are loaded at the breech, and are connected by a rod attached to a crank, one turn of which opens and shuts all the breech pieces and loads the gun. They are made ready for firing by another turn of the crank. The whole cartridge is combustible, and leaves nothing behind. The bullet can be fired a distance of 3 miles 2,000 yards with accuracy. Forty-seven out of sixty shots fired struck a target 4 feet high at the distance of 1,500 yards. The inventor is confident that at the distance of a mile and a-half he could shoot down a whole regiment of men in four minutes' time. The invention weighs 500 pounds, and is intended to be hauled by one horse and worked by two men, one to drive and the other to operate. The loading of the apparatus is so arranged that it can be detached in a moment, when the other part of the deadly engine becomes perfectly useless. One of them can be finished off complete, with horse, &c., for 1,000 dols. The contrivance is at once to be submitted to the War Department.—*Broad Arrow*.

ARMY TELEGRAPHY AND SIGNALLING.—The Secretary of State for War has directed that, subject to such regulations as may be approved by him and issued under his authority, the superintendence of the working arrangements of all permanent military telegraph stations, electric and visual, established under his authority, as well as the construction of military telegraphs, shall devolve on the Royal Engineers, as one of the regular duties of the corps, subject to the general supervision of the Inspector-General of Engineers and Director of Works. All officers of Royal Engineers and such non-commissioned officers and men of the corps as may be selected, will be required to go through a course of instruction in electricity and telegraphy, and in the method of constructing telegraph lines, in the School of Military Engineering at Chatham. These officers and non-commissioned officers will be employed, when occasion requires, to superintend instruction of work at out stations.

THE COST OF TELEGRAMS.—The wire is not nearly so much in use as it might be. A telegraphic message is a rare and exceptional thing. Telegraph offices are but thinly scattered over the country, and the charge made for the transmission of a few words is so high that, except on occasions of urgency, the money is grudged. Contrast with this our correspondent's description of the state of things in America, where the telegraph offices are upwards of 4,000 in number, or one for every 7,000 of the population, and where "over 50,000 miles of line and 100,000 miles of wire, with 265 submarine cables," are incessantly at work.

for the accommodation of the public. Still more striking is the comparison in respect of charges. In the year 1867 one company alone delivered to the American Press just about 300,000,000 words of news matter, at a cost of some £100,000; whereas in Continental Europe a service of about the same extent cost no less than £2,300,000. Such contrasts are absolutely conclusive. It cannot be a matter of doubt that our telegraphic system requires complete re-organization and development to fit it for the needs of the age. The only question is, or rather was, how that reform should be accomplished.—*Times*.

YEovil GAS-METING.—A Yeovil gas consumer says he entered a house at Michaelmas last, and on discovering that there was some slight defect in the meter he resolved not to burn any gas for the whole of the quarter. This he adhered to, and during the whole of that period he never lighted the gas once. Very recently, however, to his surprise, the collector of the company presented to him a bill for upward of 2,000 ft. of gas, consumed between Michaelmas and Christmas, although he was able to furnish the most abundant evidence that he had never used the gas, and that the meter was in exactly the same state as when he took possession of the house. It is to be feared that Yeovil is not the only place where this sort of gas-meting occurs.—*Builder*.

SUPPLY OF ICED WATER TO PARIS.—Every one who has visited the cafés of Paris, must have observed the *carafes frappées*, that is to say, water bottles with a great block of ice, often very curiously crystallized inside. The production of these frozen decanters has become a very important operation, which is carried on at ice houses situated in the Boulevard Lannes, on the Passy side of the Bois de Boulogne. The establishment consists of ten great underground ice vaults, protected from the action of the sun by buildings raised over them, and covered with straw. Each of the ice vaults is nearly 500 feet long, and about 36 feet high, and the ten are capable of holding ten thousand tons of ice. The département in which the water bottles is frozen is a curiosity. These decanters are two-thirds filled with filtered water in the receptacles of the freezing machine, and the freezing is produced by means of salt water and vaporized ether. A steam engine of sixteen horsepower is employed to work two air-pumps, which produce the vacuum in the copper reservoirs placed in the salt-water basins. After a short time the water within the decanters is reduced below freezing point, and yet it is not frozen. Each bottle is then taken in hand by a workman and its contents rapidly stirred with a stick, and the freezing takes place as if by magic. More than six thousand of these frozen carafes are sent out daily in hot weather at a very trifling charge, and each being filled up with fresh water as often as required, will serve during a long summer day and cool ten gallons of water, so that the Parisians are supplied by this establishment with about sixty thousand gallons of iced water per day. The economy of this system, as compared with the use of pure broken ice, half of which is wasted, is very evident; and besides, the ice in the frozen carafes is produced from pure filtered water.

THE FIRE-PROOF PROPERTIES OF ASPHALTE.—We have before us a communication recently made to the French Société des Ingénieurs Civils by MM. Flachat and Noisette, detailing experiments made by them to ascertain the extent of the fire-proof properties of asphalté. They relate that five fires having occurred in different buildings that contained asphalté flooring, in which all the floors and other woodwork were destroyed except that covered with the asphalté, it occurred to them that this material, hitherto only used as a flooring on which to store oats over stables, could be further utilized as a fire-proof material. In each instance the fires mentioned were arrested at the story laid in with asphalté, whether it covered the stables on the ground floor, or had been used on the upper floor of the granaries above them. The asphalté in some portions of its thickness softened or liquefied by the fire, but when help arrived and it was covered with water, it hardened again and returned to its original condition.—*Builder*.

The Proprietor of the IRISH BUILDER requests that all parties who have been furnished with accounts from the office will send the amounts of same immediately. P. O. Orders should be made payable to Mr. PETER ROE.

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House of Commons, 2nd March, 1864.

DEAR SIR,—In reply to your note, I beg to say that I have used both the sorts of Cement manufactured by your firm, and that of Messrs. Francis & Son; I mean the Cement usually called Roman Cement, or the more recent introduction of Portland Cement. I believe those Cements, manufactured by either of your firms, to be equally good. I know no difference, chemically or practically, between them; and I should use, and authorize to be used indifferently, either one or the other. You are at liberty to use this note, if you think it necessary.—I am, Dear Sir, your obedient servant,

Messrs. White & Son. (Signed) WILLIAM TITE.

From R.O. MINNIE, Esq., Surveyor to Board of Ordnance, London.

War Office, Pall Mall, London, S.W.,

3rd March, 1864.

GENTLEMEN,—In reply to your request, I have much pleasure in stating my favourable opinion of the quality of your Portland and other Cements, which have been extensively used in the Public Works connected with the War Department at home and abroad, especially in several of the fortifications now being erected in this country. On all occasions within my knowledge the quality has been equal to that of any other manufacturer, and has given great satisfaction.—I am, gentlemen, your obedient servant,

(Signed) R. O. MINNIE, Surveyor.

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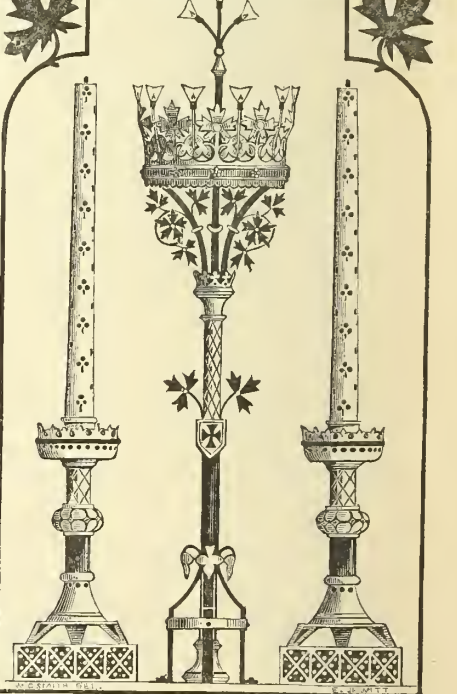
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The Irish Builder.

VOL. XI.—No. 221.

Conclusion of the Belfast Municipal Buildings Competition.



WE have to draw attention to one of the most extraordinary reports that has ever appeared in the annals of architectural competition.

In the IRISH BUILDER of February 1st we gave a reprint of the conditions issued by the Belfast Town Council to the competing architects; and, pending the decision, we took the opportunity of suggesting what we thought were fair principles of interpretation. Had some such principles guided the Belfast Town Council in their decision, there is every reason to suppose that it would have been satisfactory. As the affair stands, it is a memento of inanity and injustice; and not even the favoured architect, whose abilities we do not for one moment question, is unamazed at the mystery of the whole thing.

It would be absurd to suppose *a priori* that the thirty competitors should not more or less fulfil the conditions. But *a posteriori* there is evidence in several most able designs submitted, that in every essential point the conditions have been met. In some instances, it is true, the conditions have been somewhat largely interpreted on the point of the proposed after extension. This point seems to have been left rather "vague," to use the surveyor's word. By referring to the IRISH BUILDER of Feb. 1st, it will be seen that we place an interpretation upon this point which we have no hesitation in saying is its reasonable meaning, and would be sanctioned by any jury of architects. Indeed, we believe that even those in this competition who have improved upon it in the instructions referring to future extension, would admit the soundness of our view. We are not, however, disposed to quibble at the mere letter of the conditions, and to stickle hypercritically so as to stultify their main scope and spirit. This would be to creep like the beetle over the floor of a building, and to judge of the architect's work by what to other eyes are no flaws at all, but only due to the incompetence of the critic. The surveyor's report is entirely negative. This is to be specially noted. It is headed, "Report on the compliance of the designs submitted with the conditions of competition." The report is a mere evasion. It begins by stating three hypotheses. The first of these is very sweeping:—"If the conditions of the competition be strictly enforced, as, in my opinion, they ought to be, none of the designs is clearly entitled to a premium." This hypothesis falls to the ground, as there are designs which do fulfil the conditions. It was, therefore, unnecessary to state this truism—a truism, nevertheless, that has not failed by the gratuitous reflection which is thus (it may be unconsciously) publicly cast upon the competitors, to ignore the merits of this competition. We regret being forced to speak in these terms, especially since the town surveyor has publicly striven to exonerate himself from the responsibility of his report. There is, indeed, too much evidence leading us to believe that the nature of the document is more suggested than spontaneous.

The second hypothesis of the report is:—"If the deviations from the conditions might reasonably have arisen from any vagueness or ambiguity in the conditions themselves, it will be for the committee to sanction the interpretation put upon any condition," which is to say less than is said by the first hypothesis, but in more words.

The third supposition is expressed in these words:—"But if the deviations are manifestly in opposition to the clearly expressed wishes of the committee, as defined by the conditions, then I should say the committee have no discretion as to waving any condition." This is to come back exactly to the point from which the report starts. If the town surveyor, when asked to report, had taken his compasses and drawn a circle upon blank paper, he would have equalled the reasoning of this report, besides being better employed. If reasoning in a circle be his forte, when the Belfast Town Council ask for a report on the competition plans, to present them with this problem is not very beneficial to them, while it is very disgusting to the competitors.

We now come to the positive part of the report. It appears from this, that there are only two conditions which are not fully met. One of these he himself admits has not been *virtually* departed from, and the other only "*set at naught in nine designs*" out of the thirty. These two conditions are—firstly, with regard to *tint*, where he says there is the "*most obvious departure*;" but where, however, he says that "*no competitor*" has broken the essential point against which the instruction was "*aimed*"; and secondly, with regard to the *grouping* of the buildings, which, he says, has only been "*set at naught*" in *nine designs*.

It appears, therefore, most clearly, from the town surveyor's report, that no essential condition of the competition has been substantially broken by the competitors, whose plans still remain for adjudication and award, according to the conditions of the Town Council. The last paragraph of the report is simply absurd. It alleges that "there are many *minor* breaches of the instructions," but they are not pointed out. As the *major* assertion utterly fails, it is really not worth while to show the fallacy of the *minor*. The surveyor alludes to an *abstract* which he has prepared, showing these "*minor breaches*." The fact of it is, that this so-called report is all moonshine; the light, however, it has cast upon the merits of the case has proved sufficient to enable the "Town Hall Committee" to act rather precipitately and unjustly. What have they done? Why they have adopted a plan which they themselves admit utterly transgresses the conditions, while they say in the same breath that it fulfils the conditions! What have they said? Why, that "the greatest impartiality has been observed" in this selection. This is not true. They say that "merit alone had decided the committee in their selection." This is not true. They say that a police barrack for fifty men, space for which was to be reserved, "could be erected in connection with this building." That is not true. They say that, with "*slight alterations in the plans*" the fundamental conditions could be met. This is not true. They say that, with these alterations, the plans selected "*are suitable for the purpose*." This cannot be true. They say that they "*are suitable for every purpose for which they were designed*." This is self-evidently untrue. We have no wish to mention any name, to reflect on any design,

nor to promote anything but a *bond fide* selection. We cannot, however, but record the unblushing knavery of this dishonourable transaction. No sooner were the designs sent in, than they were exhibited to the public. This was most foolish. Until the awards had been made, the public should not have seen them. This would have prevented all the public correspondence that has taken place on the matter, besides any disputes (if they have existed) between the competitors. Taunts have, we understand, been thrown out, that one reason why no award is made is, that there might be a want of agreement between the competitors! It will be improbable to suppose that there is any lack of unanimity amongst the competitors in sustaining the rights and the status of their profession. Meantime, the surveyor to the Belfast Town Council, who seems to be fond of quoting Latin in his public epistles, will easily understand the quotation, *ne sutor ultra crepidam*, in order that there may be a fair decision.

The town solicitor has "advised them very carefully," and finds that "no prizes can be awarded." The "Town Hall Committee" state that sufficient praise cannot be given to their solicitor and surveyor for their immense exertions in the matter. This is very rich. Perhaps instead of "*deviations*," "*departures*," and "*breaches*" of the conditions, the designs which have approximated more or less, and in some cases fully met the intentions of the conditions, will not be "*set at naught*," and their authors "*sold*" in this villanous manner. We hope not.

VIOLET HILL, BRAY, CO. WICKLOW.

THE subject of our illustration in this No. is a mansion recently erected for Edward L. Griffin, Esq., from the designs of Mr. William Fogerty, architect. The accommodation is as follows:—Hall, 24 ft. by 16 ft.; separated from principal stairs by a screen of marble columns; library, 24 ft. by 17 ft.; drawing-room, 27 ft. by 18 ft.; dining-room, 24 ft. by 17 ft.; breakfast-room, 18 ft. by 14 ft. There are extensive and complete kitchen offices and twelve bed-rooms, with bath-rooms, cloak-room, w.c.'s, and lavatory. The cost, including garden wall, has been about £5,000, and the projected stable offices will cost about £1,200. Mr. George Moyers is the builder, who has carried out the work in a most creditable manner under the direction of the architect. The material is red brick, with dressings of granite and Bath stone. All the interior woodwork is stained and varnished. The site commands delightful views of the Sugar Loaf and other well-known mountains. Altogether the building presents a very favorable specimen of an "Irish Gentleman's House."

STUCCO: A MADRIGAL.

Behold the domes of wealthy pride
In London's Western quarter;
The best of them are built, inside,
Of sorry bricks and mortar.
Whilst you survey their outside fair,
With admiration struck, O!
Remember that the fronts they wear
Are but all stucco, stucco!
All stucco, stucco,
All stucco, stucco,
The fronts those splendid mansions wear
Are naught but stucco, stucco.
So beauty's but skin-deep at most,
Thus much you may depend on,
Beneath it there's no more to boast
Than muscle, nerve, and tendon.
If ever you a wooing go,
Consider that, young Buck O!
Fair face, which hides such things below,
Is but all stucco, stucco,
All stucco, stucco,
Is as a mask to things below,
And naught but stucco, stucco.

THE SCIENCE OF COLOUR.*

MUCH of the value of what has been ascertained about colour is lost through a misconception of some essential points, and important discoveries have been fruitless for want of being known and understood by those who should use them. Though nature affords a marvellously beautiful and easy mode of instructing and directing the eye in colour, its use has been hitherto ignored in art. Fancy has been often substituted for reason, and authority and positive assertion for evidence, and even when experiment has been appealed to, it has been without understanding its meaning. Hence principles have been laid down as fundamental truths which have no foundation in nature, and are of course useless in art.

Colours are nothing but sensations excited in the eye by light. There are innumerable different kinds of light, each distinguished by its peculiar refrangibility, and the peculiar sensation of colour with which it affects the eye. The colours of all objects are combinations of the colours of those particular kinds of lights which the same objects may happen to send to the eye. This being so (and there is nothing in science better established), the knowledge of that splendid series of colours which constitute a perfect prismatic spectrum—which are, in fact, the colours of all possible kinds of light arranged in the order of their refrangibility, and, therefore, the elements of all colours in nature—must be, if not the foundation, at least a very essential part of the science of colour. If some of the prismatic colours are capable of producing by mixture all the rest, whilst themselves are not produced by mixture of any of the rest, they may, for all practical purposes, be treated as the real elements of colour, and denominated “primaries,” in preference to all the rest; for if these prismatic colours, when mixed, can produce the other prismatic colours, they can *a fortiori* produce all the colours in nature, which are merely mixtures of the prismatic colours. The great difficulty and difference of opinion that has prevailed about the question of primary colours has arisen partly from ignorance of the cause of the colours of pigments and other bodies, and partly from ignorance of the nature of the prismatic colours. Here lies the peculiar complication which proves a stumbling block to many on the threshold of the science. A double analysis has to be made of the colours or natural objects before we can arrive at the real elements of colour. It seems difficult to analyse them into their component prismatic colours, but this is not enough; the prismatic colours themselves must also be analysed into the real elements of colour. We must find out whether the sensations excited by the simple homogeneous rays are themselves simple or compound, and which are simple and which compound.

Newton, with marvellous skill, effected and proved the first analysis by the aid of a prism, and called the prismatic colours primary colours, because he did not go on to investigate the relations of these prismatic colours to each other, but assumed, as it seems, that they were all equally simple and uncompounded, notwithstanding that in some of his admirable experiments he found that adding together parcels of the prismatic rays produced colours which were identical with those of other simple prismatic rays. About a century after Newton, Tobias Mayer, the great German astronomer, observing that it was possible with mixtures of red, yellow, and blue pigments to produce an imitation (though but a poor one) of all the prismatic colours, concluded, too hastily, that these three alone were simple colours, and deserved the name of primary colours. Had he tested his conclusions by any cross experiments; or, in the manner of Newton, investigated the way in which the colours of pigments and their mixtures were produced, he would have found out (what Newton had clearly stated before him, over and over again) that pigments

act by destroying light, and that the colour of the mixture of two pigments is not a mixture of their separate colours, but merely the colour of those prismatic rays which both of the pigments leave undestroyed—some colour, in fact, which is common to the colours of both of the separate pigments. But Mayer's views were plausible; they seemed obvious to the eye; the illusion they concealed was not easy to make so clear; they were adopted and laid down authoritatively by Scheffer in his “Art of Painting,” and by other writers; and, therefore, without any scientific examination they were, and are to this day, received by people in general as undoubted truths, and form the foundation of that system of colour doctrine which is now taught even in our schools of design, under the authority of the Department of Science and Art; and which also prevails on the Continent.

After the lapse of another century, however, some accurate observations have at length been made upon the prismatic colours, and which, though they have remained for now eight or nine years almost unnoticed by practical men, will in future be regarded as having established the true theory of colour, and as having relieved the student in this department of art from the difficulty or impossibility of reconciling the requirements of a false or defective theory with the approval of a refined taste or a nicely-discriminating eye. The experiments referred to were made by Professor James Clerk Maxwell, on the proportions in which different sets of three rays taken from different parts of the spectrum must be combined in order to produce the sensation of white, and will be found detailed in the “Transactions” of the Royal Society for 1860. They constitute a sort of trigonometrical survey of the spectrum, on a principle which determines the relations of the colours of all the prismatic rays to each other. These experiments were made with a refined apparatus and repeated many times over by different observers to ensure the correctness of the results; and they distinctly prove that three of the prismatic colours, viz., the best red, the best green, and the best blue, which occur near the beginning, the middle, and the end of the spectrum, when mingled altogether produce white, like the mixture of all the prismatic colours, and when combined in pairs produce all the intervening prismatic colours in the full strength which they possess in the spectrum; that is to say, the prismatic red and green, when combined in different proportions, produce the prismatic orange, yellow, and yellow-green, which lie between them in the spectrum, and the prismatic green and blue, when so combined, produce all the intervening sea-green hues. Hence it is evident that all the colours in nature may be exactly imitated by mixtures of the prismatic red, green, and blue; and this is not true of any other three prismatic colours. If, for instance, we take certain proportions of the prismatic yellow, sea-green and violet, we may be able to produce white by the mixture of all three, and we may also be able to produce a pale red by a mixture of the violet and yellow, a pale green by the mixture of the yellow and sea-green, and a pale blue by the mixture of the sea-green and violet: but we can never so produce the deep red, green, and blue, which strike the eye so peacefully in the spectrum, for those three prismatic colours exceed all their intervening colours in strength of hue, and therefore cannot be produced by mixtures of their intervening colours. It is because of their superior strength that when we look at a tolerably pure spectrum it seems, at first sight, to consist of bands of red, green, and blue alone; and only on a more careful inspection does it appear that the red passes through a regular gradation of colours to green, and the green through another regular gradation to blue. Thus the natural judgment of the eye perfectly accords with the results of these refined philosophical experiments; and the observation of Aristotle—the first observer of nature whose writings have come down to us, and one of the greatest that the world has seen—that scarlet-red, green, and violet-blue are

the colours of the rainbow, has been confirmed, after the lapse of more than twenty centuries, by the refinements of modern science.

Mr. Benson next explained Prof. Maxwell's experiments by means of diagrams, and gave an exposition of the colours produced by throwing together different continuous parcels of the prismatic rays, and excluding the rest, which constituted a very interesting part of the science of colour. After describing the spectra of a broad band of white upon a black ground, and a broad band of black upon a white ground, he went on to say that—

The principal prismatic colours and their combinations constitute the very alphabet of the science of colour, and are as essential to any intelligent acquaintance with it as the system of notation is in arithmetic, or the scale of notes in music. It is a most fortunate circumstance that we are able so easily to produce an invariable exemplar of colour, which though not actually perfect (since even the colours of a pure prismatic spectrum are, in some degree, diluted or mixed), yet excel all others in depth, and are, therefore, the best which it is possible to find to exemplify the nature of colours, and to teach the eye to distinguish, at first sight, the true complementary colours. How far the uneducated or falsely educated eye is liable to err may be seen by taking the diagrams of primary colours and their complementary secondaries, usually given in popular works on colours, and comparing them with the series of Nature's painting. The former are in general so extremely diverse from the truth, excepting blue and red, that they scarcely present an approximation to it. Blue, for instance, is usually opposed to a very red orange, instead of to yellow; green to red, instead of pink; red to a warm or yellowish green, instead of to sea-green—a colour that would by some be thought nearer to light blue than to green. When we consider how easily these colours are produced, how striking they are to the eye, how simple the explanation of them is, it is surprising that hitherto no attempt has been made to make use of them in educating the eye to distinguish the true primary and secondary colours, by accustoming it to the inimitably beautiful productions of Nature's unerring pencil. The student may see here in a moment how near the colour of a pigment is in hue to the true red, green, or blue, or to their complementary colours; for nothing can be easier than to compare the colour of a pigment with any of these combinations of the prismatic colours. He may also see how far any pigment, though correct in hue, falls short of the standard of perfection in the depth or in the clearness of its colour. There is no difficulty in learning how to use a prism, and a very few comparisons of its colours with the colours of pigments will generally be enough so to impress them on the observer's mind that he will have no difficulty in referring the hue of any bright pigment afterwards very nearly to its correct place in the whole circle of colour.

It may be objected, however, that in practice we have not so much to do with these deep and clear colours as with the pale, dull, and greyish colours, commonly designated “tertiaries,” though the one true and perfect tertiary is, of course, white, including in that term its every gradation in brightness, from black up to the most brilliant. There is much reason in this objection, because the weak hues of these colours, endlessly diversified as they are in strength, are not at all easy to identify, unless the eye has been educated aright on this point also. But one especial excellence of the method referred to consists in its capability of being easily and perfectly adapted to the exhibition of these pale, dull, and greyish colours also.

To the decorator nothing can be more important than a correct idea of the real hues of those pale, dull, or greyish colours which he so frequently uses to cover large surfaces, for though weak in respect of intensity, they are powerful in respect of their extent. He may wish to introduce their opposite hue, in

* Paper read by Mr. W. Benson at Institute of Architects, on the 15th ult.

small extent but great intensity, to balance them, or he may wish to relieve them by using some border of a similar hue in greater strength; but how can he do either with certainty unless he is sure of the nature of these weak hues? What means has he at present of learning? Supposing he knows the true hues of his bright pigments, he may indeed often make weak hues by mixing those bright pigments with white and black, and so judge of their nature; but it must still be very advantageous to be able to judge aright of such colours, independently of empirical methods, and for this no means are so certain and so easy as those indicated in the paper. The results deduced from the study of the prismatic colours are fully confirmed by all sorts of experiments made with the colours of pigments. For instance, we may test the colours of pigments with a prism in a beautifully simple way. We have merely to cover a small part of a strip of white paper with the pigment, and view it over a dark cavity through the prism, and we see the spectrum of the pigment colour adjoining to that of the white, and detect at once the rays which are absorbed or extinguished by the pigment, and those which it sends to the eye, to which its colour is due. Thus with respect to yellow (which many still maintain to be a primary colour, unconceived by the experiments on the combination of the prismatic rays, which show that the best yellow is produced by throwing together all from the first red to the last green ray), if we analyse the colour of aureole, of chrome yellow, or of king's yellow, or the petal of any bright yellow flower, we uniformly find that the better and clearer the yellow, the more perfectly the object reflects all the red and all the green rays, absorbing only the blue. Hence, if blue is a primary colour, it is difficult to see how it can be supposed that a colour produced by all the other rays of the spectrum is not made up of both the other primaries combined, whatever those primaries are.

Again, we may determine correctly all the intermediate colours between any two given colours, and ascertain the accurate mean between two given colours, without the slightest difficulty or possibility of error, by the beautiful method first used by the celebrated Lambert in the last century, and which the author of this paper has, in his last "Treatise on the Science of Colours," endeavoured to improve and apply to this purpose. We have merely to hold a slip of clean polished glass perpendicularly between spots of the given colours, so as to see the near spot reflected from that part of the glass through which we see the other spot. If spots of white and black are placed opposite to each other on alternate sides of the given colours, the position of the eye, in which half the light is reflected and half transmitted, is readily found, and the result there observed must be the mean of the colours. When the reflection is more oblique, the reflected light will be in higher proportion than the transmitted, and the contrary with a less oblique reflection.

Those who suppose that they can get the colours intermediate between the colours of two pigments by mixing the pigments, should compare the results obtained by that fallacious method with those obtained by this elegant and easy experiment. Gamboge and Prussian blue, for instance, make by mixture a green darker than either the yellow or the blue of those pigments; the scientific method gives as their intermediate colour a grey of mean brightness, in agreement with the results obtained by experiments on the combination of the prismatic rays. So also it does with the colours of king's yellow and cobalt, or lemon-yellow and French blue or ultramarine. If we avail ourselves of the well-known property of Iceland spar to give double images of two coloured spots, and arrange the spots so that one image of both shall fall together, we obtain the same results; and so also if we excite the sensation of the two colours in rapid succession on the same part of the retina, as by the well-known method of rotation. But neither of these methods are so

convenient in practice as that of the slip of glass: they are only mentioned to show in whatever way we can mingle two different colour-sensations, we obtain the same results. The results of all the author's experiments with colours of pigments plainly agreed with his former experiments on the combination of the prismatic rays, and confirm the opinion that red, green, and blue are the primary, and sea-green, pink, and yellow the secondary colours.

THE ROYAL INSTITUTE OF THE ARCHITECTS OF IRELAND.

THERE was an ordinary general meeting of the Institute on Thursday evening, 18th ult., W. F. Calbeck, Esq., Fellow, in the chair. The subject for discussion was—"Cheap Dwellings for the Working Classes in Town and Country." The discussion was opened by Mr. Charles Geoghegan, Fellow, who detailed his experience in connection with the Irish Industrial Tenements' Company and their buildings in Meath-street, of which he was the architect. He thought the alteration and adaptation of old but sound buildings in the poorer districts of Dublin the direction which such efforts would most profitably take. The dwellings in Meath-street were very neatly kept by the tenants. It was hard to get working men in Dublin to pay such a rent as would afford them three rooms.

Mr. John Lanyon, Fellow, surprised the meeting at the low rate at which it was possible to build comfortable houses in Belfast.

Mr. William Doolin, Associate, referred to the result of the competition for the Abercorn prize for cottages, offered through the Royal Agricultural Improvement Society of Ireland. He thought it extremely difficult to provide the accommodation specified for labourers' dwellings, within the limits of the estimate. The question of really "cheap dwellings" had not yet been satisfactorily solved.

Mr. M'Curdy, Fellow, V.P., referred to a rapid mode of erecting cottages in the South of England, with boarding covered with thin bricks or tiles.

Mr. E. Trevor Owen, Fellow, and Mr. T. Earley, Associate, also spoke on the subject.

Mr. J. H. Owen's paper on "Damp" was postponed to a future meeting.

The paper for next meeting (18th inst.) will be by Mr. Thomas Earley, Associate, on "Stained Glass."

ROYAL COLLEGE OF SCIENCE.

PROFESSOR R. S. Ball delivered on Monday evening the first of his course of six popular lectures on "Mechanics and Machines." The special subject of this lecture was "The Force of Gravitation." The laws of falling bodies were first demonstrated by dropping, with the help of electricity, iron balls from the top of a post 20 feet high. A large and small iron ball being disengaged simultaneously, they reached the ground together. The same result was obtained with an iron ball and a wooden ball; while, when the iron was dropped with a ball of cork, the slight retardation of the latter was shown to be due to the resistance of the air. It was next shown that a body falls 16 feet in a second. A pendulum oscillated in such a manner that at each record it interrupted an electric current, and thus rang a bell. An iron ball was supported at a height of 16 feet on the post by an electro-magnet. When the pendulum was allowed to swing, at the first tick it rang the bell and dropped the iron, and at the second tick the iron reached the ground. By allowing a wooden ball to run down an inclined groove attached to the wall, the ball on leaving the groove darted off in a curve. The nature of this curve was shown by fastening to the wall ten hoops like croquet hoops, through all of which the ball passed without touching one. The curve marked out by the hoop was shown to be the parabola. A wooden ball, covered with tin foil, was then placed on a groove; the two edges of which likewise was

covered with tin foil, were connected with a battery, and an electro-magnet at a distance of 7 feet or 8 feet was also in the circuit. As long as the tinned ball was on the groove the electro-magnet supported another ball attached to it at the same height from the floor as the groove. By a spring the tinned ball could be darted off the groove with any horizontal velocity given to the ball. The time occupied in the descent was the same as that required by the other. The lecturer concluded by exhibiting projected on the screw Platian's experiments on the form of a liquid removed from the action of gravity.

THE PROSPECTS OF ENGINEERS.

THE *Engineer*, in discussing the prospects of the engineering profession, thinks that the amount of engineering to be done just now is woefully in an inverse ratio to the number of engineers eager to do it. Not very long ago every young engineer expected to rival Mr. Stephenson, and consequently, now that they find their prospects less brilliant than they anticipated, they are eagerly looking out for places under Government. The appointment of Mr. Bright to the head of the Board of Trade has encouraged all the youths of Cottonopolis to look for comfortable appointments, varying in value from £300 to £1,000 per annum. The *Engineer* has received a good many inquiries respecting such posts, and, by way of reply, directs the inquirers to its advertising columns where the "official notices" show very placidly what is required from Government engineers. A surveyor of passenger steamships, for instance, under the Board of Trade, has to survey passenger vessels, to examine whether their hulls, boilers, engines, &c., are of good workmanship, and fit to carry passengers. A Board of Trade surveyor has also to conduct the examinations of engineers for certificates of competency in the management of marine engines. He must prove that he has served an apprenticeship, and has a practical knowledge of the construction and repairs of steamers and machinery, and that he has actually worked at sea in the engine-room. There are about forty of these surveyors at the ports of the United Kingdom, their salaries varying from £250 to £300 per annum. But it is quite clear that no young man just leaving his apprenticeship would be eligible for such a post. The number of candidates is always large. The last vacancy in November produced between thirty and forty applications. A surveyor's office is no sinecure, for in case of a boiler examined by him exploding before the expiration of the certified time, he is liable to imprisonment for manslaughter. It is one of our legislative anomalies that only passenger vessels are surveyed; ordinary vessels can go to sea in any state, but it is to be feared that at present we shall not have an extension of the Act. The engineer surveyorships are almost the only situations of the kind under the Board of Trade, as the inspectors of mines are under the Home Office. The inspectors of railways are indeed in Mr. Bright's department, but there are only three of these gentlemen, and they are all selected from the army. The *Engineer* holds this to be a mistake, as they are necessarily without engineering training. In other branches of the service there might be considerable improvements, but is quite plain that ambitious and inexperienced youths had better turn their attention elsewhere.

LONDON.—The following tenders have been sent in for the carrying out of the new street from Holborn-circus to Shoe-lane, for the Corporation; Mr. William Haywood, engineer; quantities by Mr. W. F. Stent:—Mr. Clemence, £10,276; Mr. Trollope, £10,100; Messrs. Mowlem and Co., £9,816; Mr. Little, £9,640; Messrs. Browne and Robinson, £9,612; Messrs. Ebbs and Son, £9,542; Messrs. Mansfield, Price, and Co., £9,473; Messrs. Jackson and Shaw, £9,135; Messrs. Gammon and Sons, £9,090; Mr. Macey, £8,994; Messrs. Hill, Kiddell, and Waldram (accepted), £8,771. —*City Press*.

MECHANICAL ARTS.

IRONFOUNDING.

(Continued from page 40.)

CASTINGS of certain shapes are liable to considerable distortion in cooling, so that the patterns have to be prepared to counteract this tendency. Castings contract in cooling from a 98th to a 95th of their length, thus the patterns require to be made this much larger than the intended sizes of the castings. The general increase of measurement allowed for contraction is the 1-8th of an inch to the foot.

The more rapidly castings are cooled the more hard and brittle they become, and the more slowly they are cooled they are the more soft and malleable. "Chilled castings" are those cast in iron moulds, the result of which is that the surface of the casting for some depth resembles hardened steel, and is so hard that it cannot be worked by a file or any edge tool. "Malleable castings" are made by being kept at a red heat in contact with some of the metallic oxides for about five days, and allowed to cool very slowly.

In green sand moulds the upper surface of the casting cools first, owing to the free evaporation of the moisture in the sand above it. Should the casting be of any depth, its bulk will not allow the upper surface to cool quickly, and its shape will not likely be altered; but should it happen to be of any great extent of surface and little depth, the upper surface will cool rapidly, and it will bend greatly, the concave side being upwards, so that if the pattern were straight the casting would be bent. In this case, if the casting were required to be straight, the pattern would be made in a bent form, and moulded with the concave side under or in the opposite direction to that to which the casting would tend.

In cast iron frames, or any other piece of cast iron work, sharp internal angles in the junction of large and small pieces ought to be avoided, as small pieces cool so much sooner than the large as to be drawn away from them, and thus cause a fracture at the junction of the two, whereas if the large piece tapered gradually into the small, the casting would cool much more regularly, and would, of course, be much stronger.

The most exposed and least bulky parts of the casting cool first, and should it bend in cooling, these parts always take the hollow side. The annexed figures represent cross sections of two cast-iron beams. In fig. 1 the

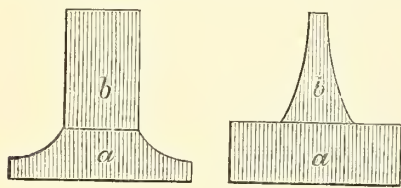


Fig. 1.

Fig. 2.

two ribs on the side *a*, being the least bulky, will be the most likely to cool first, so that if the pattern were straight the beam would be bent, *a* being on the concave side. From the same cause the beam (fig. 2) would likewise be bent,



Fig. 3.

Fig. 4.

but in the opposite direction to that taken by fig. 1. In this case *b* would be on the concave side. The annexed figures represent the end and side of a common eve gutter. It will be seen that the lips *a* and *a*, fig. 3, are the most exposed and will cool soonest, so that the gutter will bend up as represented by fig. 4, *a* and *a* being on the hollow side. The patterns for making these straight gutters are thus required to be made of a bent form.

In many cases the arms of wheels are made much lighter than the rims; in all such cases there is great danger of fracture at the junction of the arm with the rim, and in some cases there may be no apparent fracture, and yet there may be such a strain on this point

as that a blow with a hammer, on any part of the wheel, will make the arm instantly spring or separate from the rim. There are two methods of counteracting this: one is to expose the rim to the air while hot, and by showering water on it to cool it as rapidly as the arms; the other, and best method, is to cast large pieces of iron alongside of the arms, which do not allow them to cool much sooner than the rim.

MUNICIPAL BUILDINGS, BELFAST.

At a meeting of competitors, held in the Athenæum Rooms, Belfast, on Saturday, February 27, the following resolutions were passed unanimously. Several letters of strong protest were read from competitors residing in distant towns, and one from an eminent, firm stating an intention of legal investigation in case the competitors should fail in obtaining a just decision.

Resolution 1. That we hereby protest against the refusal of the Town Council to accede to the memorial of the competitors, recommending that a competent disinterested architect should be called in to report upon the merits of the designs for the guidance of the Council in making their award; and we also protest against the obvious unfairness and injustice of affording one competitor (whose plans have admittedly violated the conditions of the competition) an opportunity to re-consider and amend them.

Resolution 2. That the following gentlemen [here follow the names of several competitors] form a sub-committee, for the purpose of drawing up a protest to submit to the Town Council, and for publication in the newspapers.

[The fairest way to decide this competition would be for the Council to conceal the names of the architects, and to obtain the report of two competent architects upon them, the one to be chosen by the Belfast Town Council, and the other by the competitors.—Ed. I. B.]

ON VENTILATION.*

On the 24th ult. Dr. Edward Smith, F.R.S., read a paper on this subject, at the Society of Arts. After setting forth, first, general principles, and, second, modes of ventilation, the lecturer stated thus the conclusions to which a consideration of the subject and his official experience had led him:—

1. Interchange of air which proceeds both by diffusion and removal is not instantaneous. The rapidity of the interchange varies with many circumstances.

2. The effects of any natural system of ventilation vary with the season as well as with the special conditions of a building and the number of inmates.

3. There is a relation between ventilation and temperature, which in reference to inhabited rooms is generally an inverse one, and as the human body requires a temperature of the air of from 55° to 65°, according to the season, ventilation in cold weather must be restricted by the lower, and in hot weather by the higher temperature.

4. The movement of the air, although so essential to health, must not be very perceptible, lest it should cause discomfort and disease. Hence the inlets and outlets must not be very near to the inmates, and the current must be divided.

5. The ventilation should, if possible, be self-acting, after the amount required in a given room and under given conditions has been fixed.

6. Any general rule which may be laid down as to the number and size of the ventilators required in a room will demand modification by experience, since the admission of air will depend upon the elevation of the site, the direction of prevalent winds, and the impediments which surrounding walls and buildings offer, and these cannot be the same on all sides of a building.

7. Some differences in the plan, and much in the extent to which the plan should be

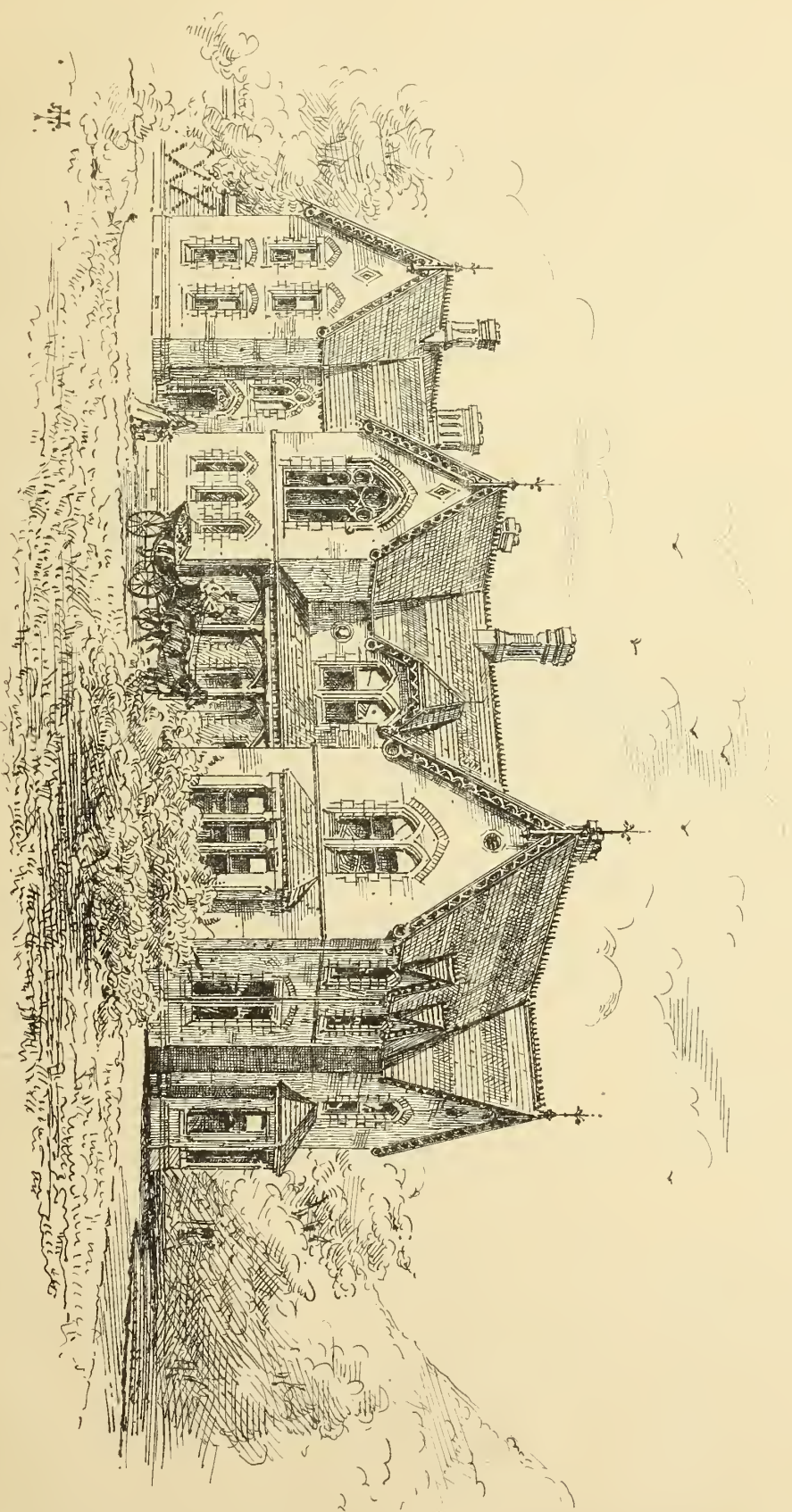
carried, must depend upon the use of the rooms and the destination of the building, as to whether it be a private house, a public building with a fixed number of occupants, or a building, as a theatre, with a very varying number.

8. There is a relation between space and ventilation, for it is evident that with defective ventilation (not entire absence of ventilation) the larger the quantity of air in relation to the number of occupants the less the immediate evil, whilst at the same time, the larger the mass of air to be moved the greater is the force, or the more extended are the means required to move it. In private houses the cost is often unimportant, but in general, and particularly in reference to work-houses, hospitals, and other charities supported by voluntary contributions, the aim should be, by providing the best ventilation, to reduce space to the strict requirements of the occupants, and thus to utilize in the greatest degree the money to be expended. That relation must be determined by experiment. Both architects and amateurs are apt to give undue weight to the lofty, spacious, and handsome appearance of their buildings, and too little to the solution of the problem of fitness with economy.

9. The test cannot be the life or death of the inmates, for health may be failing long before it ceases. Moreover, there are various degrees of health, and each person has a separate aspect of health, and it is not at all easy to indicate in particular cases the first period when some injury may have been done to it. A test is required by which we may infer that injury would result if the cause were continued, and this must clearly be derived from observation. A close-smelling or a foul-smelling room may not be immediately injurious to health, but it is disagreeable at the least, and as such should not be allowed; and although the most injurious emanations from the body are not offensive to the smell, their emission is accompanied by the emission of offensive odours, and the two will co-exist. There is thus a relation between them which may be made useful as a test, so that if in an inhabited room the air be foul to the sense of smell, it may be regarded as injurious to health. But the degree of relationship is not exact, since an uncleanly person, or even a cleanly one having the peculiarity of emitting strong odours in an unusual degree, will cause the air to be foul almost as soon as he enters, whilst another cleanly person may stay some time in the same room before rendering it offensive. Hence, in making the estimate, we must strive to ascertain whether the foul smell proceeds from dirty clothes, and particularly dirty stockings and unwashed skins, or is simply that which occurs with cleanly persons. When there is no offensive smell it may be assumed that the ventilation is sufficient; but as a certain amount of want of freshness, or closeness, is found in our bedrooms or other rooms without known injury to health, I am of opinion that the ventilation is sufficient when the air, after the night's use, is not more offensive than is found in an ordinary private bedroom of the middle classes. Absolute purity of air in inhabited places, whether rooms, houses, public buildings, courts, streets, or towns, however desirable, is not necessary to health, and is not attainable.

10. The test cannot be the means provided to effect the passage of a given quantity of air through a room in a given time, for if the ventilation depend upon natural agencies, it will vary with the force and direction of the winds, the impediments to their action upon a particular ventilator, the frequency with which doors are opened, and other varying causes. If the room were closed, except at particular places, and the air were, by artificial means, conveyed through apertures at a known rate, it would be possible. We do not, however, live in closed boxes, and we cannot separate ourselves from the influence of natural causes.

11. Where persons do not occupy the same room or rooms throughout the twenty-four hours, but use other rooms, and particularly



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spend much time in the open air, defective ventilation of those rooms will be less injurious in proportion as they are used for a shorter period of time.

12. The cost of ventilating buildings is usually of importance. None can be so little as that mode which introduces the external air directly, but with proper safeguards, whilst all artificial systems are expensive.

13. No system can be efficient, in a public institution, which depends upon windows, doors, and fireplaces alone; but, for thoroughly renewing the air on fitting occasions, it is desirable that there be windows on both sides of a room, and particularly in public buildings.

14. When air is introduced on one side of a room only, whether by windows or by ventilators, the extent of its influence will vary with the conditions already named; but there is a relation also between it and the width of the room in reference to satisfactory ventilation. It is evident that, with little force of wind, the air will penetrate into the room but little, and with greater force the more; and also that, with a given force of current, the narrower the room the more certainly will it traverse it, and the wider the more certainly it will not traverse it. Hence, with such an arrangement, a wide room will be less perfectly ventilated than a narrow one, and a point may be readily reached at which the influence of such means of ventilation will be *nil*. Rooms with windows or ventilators on one side only should be very narrow, and still more so if there be no ventilation apart from the windows. A wide room, with windows only on one side, and no special ventilators which act permanently, must be ill-ventilated and unhealthy, as has been shown in the Nightingale Ward of King's College Hospital.

15. When air is introduced on two opposite sides of a room by windows or special ventilators, the current will usually extend further than twice the length of the current from one side of a room; and, as the wind will usually act upon one or the other side, the current will have greater force than with air openings on one side only. But there is a limit to the width of rooms so arranged; for, as the current must not be too great to be borne by those inmates who are placed near the external walls, its power to traverse the inner space is restricted. In very wide wards the ventilation in the middle is not so satisfactory as that near the external walls.

16. Where air is introduced into the centre of the floor of the room, a current is produced in the part over which the inmates pass and repass; and is, therefore, very perceptible. Cold air in considerable quantity can rarely be introduced with propriety in that position, but warmed air might be borne.

17. Each room should be so constructed that its ventilation may be independent of that of staircases or any other room; but where two rooms are placed side by side with a partition wall between them, each having windows on one side only, the ventilation of each is improved in proportion as a part of the partition wall is removed. Thus, one room may improve the ventilation of the other, and both be as if they had windows or ventilators on both sides.

18. Ventilators should be placed on opposite sides of a room, be of small size, sufficiently numerous to affect all parts of the room, defended on the inside by finely perforated zinc, and be placed at the floor-level and ceiling-level.

19. Ventilators in a small part of a room only are sufficient for ventilation, since when a current of air passes between two openings the greater portion goes in a direct line, and does not greatly mix with the air lying on either side of it. This may be readily seen when smoke is admitted by an inlet, and emitted by an outlet ventilator, or such an arrangement as exists in prison cells.

20. Where the conditions rapidly vary, as in churches, chapels, and theatres, it is impossible to devise a system which will not require modification by an intelligent person. At present the system is universally defective,

and only after the heat has become great and the persons very sensitive to cold are the doors or windows opened. The aim should be to regulate the admission of air from the moment when persons enter, so that the temperature shall never be materially increased, but remain at say 56° in winter and 62° in summer. Cool air without draughts is better borne than hot air with intermittent draughts. In very lofty rooms the apertures for the admission and emission of air should be below the top, not too far removed from the occupants of the seats, the sources of the heat. In addition to this, however, ventilators should be placed in various parts of the ceiling, and be kept under control by a competent person.

21. Such rooms should be thoroughly aired after every occasion of their use, by the full opening of windows. At present, with three services at a church or chapel, this is neglected, and the air is close, heavy, and foul in the afternoon and evening.

22. No artificial means of ventilation should be relied upon solely, which will not act by day and night and throughout the year. Hence with ventilating stoves, which are very valuable, and ventilating air-flues, there should be other and self-acting means of ventilation.

In conclusion, it may be useful that I should sum up the principal errors into which architects are now falling in the systems of ventilation which they recommend. They are:—

1. In not duly estimating the practical limits of the law, that heated air ascends; and the relation of numbers of inmates and size of rooms in the application of the law.

2. In not duly considering that air-shafts, acting under that law, cannot act in all seasons, and with and without fire alike.

3. In not duly estimating the amount of air which can be admitted by windows and doors alone.

4. In not duly estimating the practical limits to which an entering current may be carried, whether from one or both sides of a room.

5. In not duly considering the effects of currents upon inmates, and the limitation thus demanded upon the amount, force, and elevation of currents.

6. In not duly estimating the inverse relation of ventilation to temperature in its effect upon inmates, and particularly upon the old and the young.

7. In not duly estimating the influence of the winds, and the impediments of surrounding buildings, &c., upon each aspect of a building.

8. In having incorrect views as to the direction of the current through ventilators at different elevations.

CORRESPONDENCE.

[It is to be distinctly understood that although we give place to letters of correspondents, we do not subscribe editorially to the opinions or statements set forth in same.]

RIGHT- AND LEFT-HAND LOCKS.

[From the Builder.

SIR,—May I venture to submit a more precise definition of the hands of door-locks than that given in the *Builder*.

1st. In all cases, whether a door opens inwards or outwards, if, when you stand *outside* facing the door, the lock shoots towards the right hand, it is a right-hand lock; if towards the left hand, it is a left-hand lock. This rule equally applies to dead, spring, or two-bolt locks.

2nd. For two-bolt or spring locks, when the doors open *outwards*, apply the same rule, and add the words "reverse bolt."

Any lockmaker can supply locks of the proper hands if these rules be adhered to.

JOHN CHUBB.

TO THE EDITOR OF THE IRISH BUILDER.

SIR,—In reply to the inquiry in your last number asking explanation of the terms right and left-hand locks, the lock into which you put the key with its back up when facing the

front or outside of the door, and which shoots its bolt to the right-hand, is termed a right-hand lock; the door also opening at the right-hand side, and the lock shooting its bolt to the left, under similar circumstances, is termed a left-hand lock. Without these distinctions the same lock might be placed on a door opening at either side, and made to serve as a right or left-hand lock; but if placed differently from those above described, would not continue to work so pleasantly or wear so long, as from the position of their wards they would be more exposed to injury from dust and wet, and from other causes, wilful or accidental. By adhering to the above rule, any person can purchase his own locks correctly of the description needed, and will find it a safer guide through the mystifications of interested parties than any of the three replies which have already appeared in the *London Builder* to this same inquiry, the insufficiency of all which for guidance to practical application induced me to forward a fourth reply similar to the above, but which has been suppressed, whether on account of coming from one of those classed in England as wild Irishmen, or it being thought presumptuous in such attempting to supersede the more precise definition of a Chubb of Patent Office celebrity, you, Mr. Editor, can likely determine.

Belfast, 24th Feb., 1869.

N.

A MONSTER ROPE.

SOME time ago we (*Aris's Gazette*) noticed, from an American paper, the manufacture of "the largest rope in the world." If we remember rightly, that rope weighed just twenty tons. A rope is now being manufactured at the Universe Works of Messrs. John and Edwin Wright, Birmingham and London, which completely eclipses all previous achievements, literally speaking, in the same "line." It is round wire rope 5½ inches in circumference, 11,000 yards long and weighing upwards of sixty tons. The rope consists of six strands, ten wires in each strand, each wire measuring 12,100 yards. The whole length of wire in the rope is 726,000 yards, or 412½ miles; the six strands surrounding a hemp centre of 27 threads of rope yarn being made from Petersburg clean hemp, each thread measuring 15,000 yards, the whole length of rope yarn being 405,000 yards, or a little over 230 miles. On the completion of the manufacture the rope finally receives a good coat of composition of Stockholm tar and boiled linseed oil. The rope is made from Messrs. Webster and Horsfall's patent charcoal wire, manufactured at Hay Mill, near Birmingham. The wire is all tested, and is guaranteed by the contract not to stretch more than 6 per cent. without breakage. The sample which we saw tested, after a tremendous strain, broke just at 4 per cent. The humpen portion of the French Atlantic Cable is now in process of manufacture by the same firm, Mr. Horsfall supplying a large portion of the iron wire.

NOTES OF WORKS.

A new warehouse has recently been completed at 76 Thomas-street for Messrs. Baker, Wardell, and Co., wholesale tea merchants. The building consists of offices and wareroom on the ground floor, the latter being situated in the rear, and lighted from the roof; dwelling-house above and fireproof cellars beneath. The front is faced throughout with Dalkey granite, excepting some panels, which consist of red Peterhead, polished. The fittings of office and wareroom are designed in conformity with the architecture of the building, and, like the rest of the exposed woodwork, are oiled and varnished, no paint having been used. The architect is Mr. W. M. Mitchell, 33 Dawson-street; and the contractors, Messrs. Roberts, of Grand Canal-street.

The new parish church, Newtownhamilton, was opened on Sunday, the 15th ult.

Portrush Church is to be enlarged and improved. Funds are being raised for the purpose.

ANTIQUITIES ON ARANMORE,
BAY OF GALWAY.*

(Continued from page 48.)

THE STONE FENCES.—These are simple stone walls used as boundaries to mark off and defend the fields and gardens enclosed by them. Some are double, a few single, and extremely well built, considering the kind of stones with which they were constructed. They are without cement, and the stones used seem to have been partly worn down by friction, though not to such an extent as those usually obtained on beaches; while others are surface stones, but not such as could have been raised in the vicinity of the walls. They are limestone, but none similar to the partially worn down ones are now visible on the shore. The fields partitioned off were of good size, but the soil must have been very shallow, as the walls rest on the solid rock; this they would scarcely do if any great depth of either clay or sand existed at the time of their erection. If the sand, until lately forming an extensive plain, had been there then, there would be very little likelihood indeed of the people being so very unwise, or so fond of useless labour as to sink down to the foundation rock, and then only raising the fences to about half the height of the sand plain. This would have been a procedure of such rare, and so foolish a character, that it need not be entertained for a single moment. We find the fences, some altogether denuded of sand, others with one side uncovered, and the sheltered side buried in it. In other places, where it has been only partially drifted away, the fences are seen with only a foot, or perhaps a few inches exposed; following these, we find them receding under the sand until they are finally lost to view; when digging down a foot or so we again come upon them, but in all places they are found to rest upon the rock as their foundation.

The nature of the soil is difficult to make out, for in most places the now surface rock from which the sand has been swept away is quite bare, nay, even polished. It could not have been of clay, or of that gravelly kind underlying a great part of the surface soil in the islands. Either of these would have been too heavy and tenacious to have been swept away by the wind along with the sand, and certainly some remnant would be found here and there in the fissures and chinks of the rock if the soil had been composed of either kind.

That some soil existed is evident; otherwise stone fences would not have been made with such care on a soilless rock. And as all signs of clay, or soil of a clayey nature are absent, it most likely was of that description called "muirbheach," a mixture of sand and clay usually found in different proportions, and generally very productive, especially when well manured. The greater part of the sand on the three islands partakes either more or less of this description. But in this locality the soil (judging from what may be obtained at the very bottom of the fences) was formerly of the best quality of "muirbheach" (mir-vach.)

Some of the fences appear to have passed through Trághmhór (Trá-wore), thus indicating that this tidal lake was not in existence at the period of their erection; although, in an old map drawn upwards of a hundred years ago, and copied from a still older one, the lake seemingly presents the same appearance and extent as it does now. This, however, cannot be the fact, as we shall presently see. Others of the fences run out apparently under the sea; at least they are traceable to low water-mark, thus showing the sea has encroached in this quarter upon the land.

Trághmhór (Trá-wore) is a large lake-like depression scooped out of the sandbank by which it was formerly surrounded on all sides. At the north-east end of the beach the sea worked out a channel through which, at

spring tides, the sea rushes up and fills the hollow now known as "Trághmhór," or the great straud. Some few years ago the passage by which the tide enters was deeper than it now is, and was also enclosed on each side by high sandbanks. Small sail boats entered through it, and either received or discharged their cargoes from their brink. This they could not do at present, for on the north side of the channel the bank has been lowered, and partly washed away, while the south one has nearly disappeared through the united agencies of both wind and tide. Between the beach and lake, within the memory of some of the old people still living, a long stripe of sandbank of great height extended the whole length of the beach. It was reckoned the best piece of fattening land on the island; but it has been swept away, and a barren waste now occupies its place.

The southern point of this tidal lake is only separated from Port Daibhche by a narrow neck of sand. On the western brink stands the mortuary chapel of Endeus, and within forty or fifty yards of this, again, is to be found the third great object of curiosity which signalizes the locality.

Some of the stone fences already mentioned run through this lake; their direction is west and east. Their appearance here undoubtedly proves the non-existence of the water at the time of their erection. They, too, lay beneath the great sand plain; yet, in the map already referred to, we find that upwards of one hundred years ago the lake, according to it, occupied the same extent of ground it now does. But this cannot be correct, as the long stripe of sandbank already alluded to, stood, until very lately, between it and the beach. This has been swept away, and part of the ground covered by it has been added to the tidal lake of Trághmhór.

THE BED.—On the western brink of Trághmhór, about forty or fifty yards south of the mortuary chapel of Endeus, we come to a very curious old relic of bygone days. The most remarkable thing connected with it is its position. There are several others of the same kind scattered throughout the island, similar in shape and make, and also in the size of the flags with which they are formed; but these are all found on the surface rock, while the one at Iarárna lay imbedded under the often-mentioned sand plain, which in this direction ran along from within a little distance south of the village of Killeany up to the very brink of Port Daibhche, in Gregory's Sound. Taking the bank close by on which the mortuary church is situated, as showing about the average height of the plain; this bed had twelve feet of sand in height deposited over it. Some of the villagers still remember the place before the wind began to sweep away the sand. They also recollect when the bed first began to make its appearance, and before the place was entirely denuded, often wondered what it could have been. They state, that not more than from fifteen to twenty years have elapsed since it was uncovered. When this occurred they, struck by its extreme likeness to the other beds, immediately called it "Leabuidh Diarmaid agus Graine," or Dermot's and Graine's bed.

It is about nine feet long, and enclosed on three sides. The ends face south and north, which is open on that end; the west side is formed of one entire flag, rather thin for its size, and is nine feet long; the south end is also of one flag; but the east side is formed of two, whose tops have been evidently broken off, as it is somewhat lower than the western one. The horizontal capping flags are wanting, and not to be seen near the place; however, they cannot be removed far, and may be yet found under the sand close by.

There cannot be the least doubt of this being an artificial building erected by man. The flags of which it is composed are large, and firmly planted on their edges on the solid rock, on which they stand erect. Had they been found in a mere confused heap, some room for doubt might exist; but as they are, this is not possible. They form an enclosure

nine feet long by three and a-half broad, and as many in height. Its exact similarity to the other beds ascribed to Dermot and Graine, in every particular, strikes the beholder at the first glance. These personages belong to the second or third century of the Christian era, and are closely connected with the mythology of the ancient Irish. From the legends associated with them, and the stories which have reached us of their time and doings, it would appear that some change or development had been effected by them, or in their age, in the ancient Celtic religion. Their disenchanting powers, their expertness and ready ability in transforming individuals at will, by magic, into animals of various kinds, would lead us to suppose that they, if not the actual introducers, yet helped to propagate and extend a belief in the metempsychosis.

From a consideration of these ancient remains found in the locality—buried as they were until very lately under the sand—we are led to inquire, how or when this occurred. That the relics were "*in situ*" there before the deposition of the sand plain is evident. The depth of sand lodged on the rock, and the vast extent of the plain, forbid the supposition that it could have been wafted over from Killeany side. The sand there, which is also of great depth, preserves a level and uniform appearance; it, at least, has not been disturbed since Cromwell's soldiers occupied the castle of Arkin, upwards of two hundred years ago. An old stone called the cross (Cros an fheuir), which then served as a boundary mark, still exists, and in the same position. Endeus' old church, which even in its present state cannot date back less than five or six hundred years (the original one a thousand years), has been built on the summit of the plain running into Gregory's Sound. The greater part of this has been swept away; but still the old church remains to testify to the extent and height of the plain. If at the time of its erection the bank was disturbed, or appeared likely to have been drifted away, it is not probable it would have been built upon. Whether the clocháns or fences already described are of very ancient date, it would be now difficult to say; but with respect to Dermot's bed, which is pre-Christian, there cannot be the least doubt. Since its erection the sand must have accumulated there, perhaps somewhere between its time and the building of the original mortuary church dedicated to the first Christian missionary, Endeus.

Captain Rowan's map of the locality represents, with sufficient distinctness, the position of the several old remains slightly glanced at in this paper. His sketch of the clocháns show plainly to the eye every peculiarity belonging to them. Their height, shape, the passage leading to the entrance of one of the circles enclosing the other, together with the graves found on it, are easily understood from the drawing. The several fences, the direction in which they run, and the size of the fields enclosed, can be accurately gathered from it; and lastly, the position of the bed, its situation as regards Endeus' church, the sand plain, and the tidal lake of Trághmhór, are accurately marked down, so that the reader has only to glance at it in order to comprehend the locality and its antiquarian objects.

BUILDING CONTRACTS IN
LIVERPOOL.

For some time past the unsatisfactory and uncertain state of the relation between the architect and contractor in carrying out work, has been attracting the attention of the architectural profession and of the builders in Liverpool. Some months ago a sub-committee was appointed to consider the question, and to endeavour to frame such a form of building contract as would be likely to be acceptable to both architects and builders. The committee, which consisted, on the side of the architects, of Messrs. T. J. Kilpin, J. Boulton, and H. H. Stratham; and on the side

* By Rev. William Kilbride. Read at Meeting of the Historical and Archaeological Association of Ireland, and published in their "Journal," 3rd series, No. 3.

of the builders, of Messrs. J. Jones, T. Haig, and J. Roberts, have lately met, and so far as the deputations are concerned they have mutually agreed upon recommending the following form of contract, to the architects and builders of Liverpool:—

"This contract, made the day of , 186 , between of the one part, and of the other part,

"Witnesseth, that the parties hereto hereby mutually contract and agree with each other; and the said contractor, so far as the stipulations and provisions of this contract, and the works, matters, and things herein mentioned or referred to, are to be performed and observed by him, hereby agrees with the said proprietor, and the said proprietor, so far as the said stipulations and provisions, matters and things, are to be performed by him, hereby agrees with the said contractor as follows, namely:—

"1st. In the construction of these presents, when the contract will admit of it, the term 'contractor' shall mean the said ; the term 'proprietor' shall mean the said ; the term 'architect' shall mean ; or other the architect for the time being employed by the proprietor to superintend the erection and completion of the works; and the term 'works' shall mean all the works, acts, matters, and things specified and described in the specification, plans, and other drawings, and detailed bills of quantities supplied, hereinafter mentioned, and also such other works, matters, and things as are hereby contracted to be done and performed by the contractor.

"2nd. The contractor shall well and substantially, and in the best and most workmanlike manner, with the best materials of their respective kinds, and under the direction and inspection of the architect, make, execute, finish, and complete, and deliver over to the proprietor, on or before the day of , the several works, acts, matters, and things mentioned or referred to in the specification, plans, and drawings already prepared by the architect and signed by the parties, and in the detailed bills of quantities supplied, with such additions, enlargements, and alterations of, and deviations from, the said works (if any) as the architect may from time to time, during the progress of the works, direct; but further time shall be allowed if, with reasonable diligence on the part of the contractor, such additions, enlargements, alterations, and deviations should be the cause of delay in the execution and completion of the works.

"3rd. The contractor shall find all materials, labour, services, tools, scaffolding, implements, utensils, and machinery, and power of every kind, for the full, safe, expeditious, and proper carrying on and completion of the works.

"4th. The contractor shall be answerable for, restore and make good all injuries, damages, re-erectations, and repairs occasioned or rendered necessary by accidental causes, or flood, storm, tempest, fire, trespasses, or other means, to the works, previously to the completion and delivery of the same, and hold the proprietor harmless from any damage to person or property arising from the contractor's operations or neglect. The contractor shall insure the works from damage by fire in the sum of £ , such insurance to be effected in the joint names of the contractor and the proprietor. If the contractor fails to effect such insurance to the satisfaction of the proprietor, it shall be lawful for (but not obligatory upon) the proprietor to insure the same, and to retain and deduct the sums paid for such insurance from any money which may be owing to the contractor.

"5th. The proprietor shall pay to the contractor, for the full and perfect completion of this contract, the sum of £ . But if the architect shall direct any addition to, or omission of, or variation from the works, the value of such addition, omission, or variation shall be added to or deducted from the said sum of £ as the case may be; and if there should be found to be any error in the detailed bills of quantities supplied, such error

shall be rectified, and an addition be made to the contractor, or deducted from him, as the case may be, in respect of such error.

"6th. The sum payable under the last clause shall be paid by instalments in manner following, namely:—Instalments as the works proceed every month after commencing the works, at the rate of per cent. upon the value of the work done and materials provided and delivered upon the ground, such materials to become the property of the proprietor, as certified in writing from time to time by the architect, until the amount reserved by the proprietor shall equal £10 per cent. on the said sum of £ ; and when the same shall amount to such ten per cent., the instalments shall be the full value of the work and materials so certified, and, after full completion and delivery of works, whatever balance may be owing after the payments aforesaid, and the ascertaining the value of any extras and deductions, shall be paid by the proprietor to the contractor within from such completion as aforesaid. Provided that the first instalment shall not be payable until the expiration of three days after giving the architect's certificate to the proprietor, either personally or by leaving the same for him at his place of business or residence; and no instalment of a less amount than £ shall be required to be paid during the progress of the works.

"7th. The contractor shall, during the execution of the works, when directed and required by the architect, remove from the proprietor's premises all materials and works which shall not, in the opinion of the architect, be in accordance with the specification, plans, and drawings, either as regards quality of materials or workmanship; or which he shall consider unsound, ill-seasoned, defective, unsuitable, or improper. And the contractor shall, when so directed and required by the architect, remove and take down all work which the architect shall be of opinion is not done according to the specification, plans, and drawings, or otherwise imperfectly executed; and in either case proper and satisfactory materials and work shall be substituted. And if after forty-eight hours' notice the contractor shall not comply with such direction or requisition, it shall be lawful for the architect to cause the removal and taking down of the materials and works objected to, and to cause materials and works to be found and executed by some other person or persons, and the costs, charges, and expenses of the same or otherwise incidental thereto, or incurred thereby, shall be deducted from the amount payable to the contractor under this contract, or otherwise shall be paid by the contractor to the proprietor.

"8th. If the contractor shall become bankrupt or compound with or make an assignment for the benefit of his creditors, or shall wilfully suspend or delay the performance of his part of this contract for forty-eight hours, after a notice shall be served upon him or left at his last known place of abode by the architect, requiring him to proceed with and perform the same, it shall be lawful for the proprietor by the architect to enter upon and take possession of the works, and to employ any other person or persons to carry on and complete the said works, and may authorise him or them to use the plant, tools, materials, and property of the contractor there being, and the costs and charges incurred in any way in carrying on and completing the said works shall be paid to the proprietor by the contractor, or be set off by the proprietor against any money due to or become payable to the contractor.

"9th. The contractor shall, if the architect direct, suspend the whole or any part of the works during inclement weather; and if the same shall be suspended by such direction, or shall be necessarily suspended from any cause over which the contractor has no control, or any local or general strike, then the completion of the works may be delayed for a period equivalent to the time of such suspension.

"10th. In case the works and things here-

by contracted to be done by the contractor shall not be done and completed at the time hereinbefore mentioned, the contractor shall pay on demand to the proprietor as liquidated and ascertained damages a sum not exceeding £ for every week which may elapse between the appointed and actual time of completion and delivery hereinbefore mentioned, or the proprietor may deduct the same from any moneys payable or to become payable to the contractor, allowance being made for delay, if any, occasioned in the execution and completion of the works by reason of additions, enlargements, alterations, deviations and other causes, as provided for in clauses 2 and 9.

"11th. The contractor shall provide and keep on the premises where the works are to be carried on a good and efficient foreman, and if the contractor shall not provide such foreman the architect shall be at liberty, after giving forty-eight hours' notice in writing to the contractor, to employ a foreman, and the costs of so doing shall be paid by the contractor to the proprietor. The architect may dismiss any foreman, and also any workman, for incompetence or misconduct."—*Builders' Trade Circular.*

BOOKS RECEIVED.

Holy Cross Abbey, County Tipperary: a series of Measured Drawings of the Church: with descriptive letterpress. By Samuel P. Close, A.R.I.A.I. Belfast: lithographed and published by the author, and printed by Marcus Ward & Co. 1868.

Mr. Close has done good service in the departments of Irish Archaeology and Architecture by the publication of the series of lithographs before us. We were much pleased with the style in which the original drawings were executed. Our readers will recollect that for these drawings the author gained the Fitzgerald Silver Medal, offered by the Royal Institute of the Architects of Ireland, in the early part of last year. The preparation for the stone of the thirteen large sheets of lithographs contained in the work, must have fully occupied the author's leisure hours for several months. With him we earnestly hope that "the sketches will meet with approval," and that "they may be the forerunner of similar attempts." We are happy to find that a fair share of encouragement has been extended to our young author. The "subscribers'" list is tolerably well filled—not full enough, we opine, to sufficiently remunerate him for the trouble he has taken in this praiseworthy effort to illustrate one of our ancient buildings. In the typographical portion of the work there are a few errors which might have been avoided; in a future edition they will of course be corrected.

We must make room for a few passages from the descriptive matter given by the author:—

"The Abbey of Holy Cross is beautifully situated on the banks of the river Snir, between Cashel and Thurles, about seven miles from the former and three from the latter. . . . The architectural character of the building is remarkably fine, and is considered by many to be one of the best remains of Middle Pointed work to be found in Ireland. The Abbey Church is cruciform in plan, and consists of chancel, choir, nave, north and south transepts (with two chapels opening off each of the latter), aisles to choir and nave, and lofty tower at the intersection of the Cross. The monastic buildings on the south side covered a considerable area, but they are for the most part very ruinous and dilapidated, and completely enmantled in ivy. . . . The difference of the work in this monastery is very remarkable. Nothing could have been more highly finished than the chancel, tower, north transept and adjacent chapels, which are all built of black marble and limestone; and in many cases these portions are in such good preservation, and are constructed of such durable materials, that the mouldings are as sharp and fresh as when executed, and in many places still bear the mark of the mason's chisel. . . . Here and there may be seen, in endless varieties, monograms and devices, emblems of the Trinity and Eternity, and other mystic and Masonic signs, an interesting proof of the spirit which actuated these great master masons of old."

Laxton's Builders' Price Book for 1869, for the Use of Architects, Engineers, Builders, Contractors, Surveyors, and all the Building Trades. London: Morgan and Chase, Ludgate-hill.

THE high character which "Laxton's Builders' Price Book" has borne for many years, as a standard work of reference amongst architects and builders, is fully sustained by the issue for 1869. The edition before us contains seventy thousand prices for materials and labour, embracing every item that could possibly be brought into connection with building; many important and useful memoranda relating to the various trades; a list of the stone quarries of England and Scotland arranged in districts, with the weight and price of each stone, at the quarry and delivered in London; a capital detailed estimate, which will be found of great value to the beginner, a form of contract, the whole of the Metropolitan Building Act, and explanatory notes of cases, written by a lawyer, and many tables and lists, all of which are exceedingly useful.

We might particularize the memoranda on cast and wrought iron girders and columns, and on masonry, as being specially replete with reliable information. Every branch of trade has been treated of ably and carefully, each in its proper place. Evidently no trouble has been spared in revising the prices and tables, and, in cases where the prices of materials are constantly fluctuating, a scale of calculation has been adopted which will enable the student readily to adapt his figures to such variations. Any new items caused by the expanding nature of the trades, and the adoption of new methods of manufacture have been carefully introduced. In fact, "Laxton's Price Book" ought to be in the hands of all architects, builders, engineers, surveyors, and others connected in any way with the building trade.

Before closing our remarks, we must express our regret that Ireland should have been completely left out and ignored; for example, in the list of stone quarries, Scotland receives her share of attention—every quarry of importance is noticed, and buildings where each particular stone have been used, are instanced, how long built, and with what result, &c.; but not a word of the beautiful Irish marbles, granites, limestones, or sandstones. We are in hopes, however, that 1870 will witness the establishment of an Irish Builders' Price Book, for which we predict the hearty support of all sections of the profession and trades.

Vere Foster's Drawing Copy Books.—These books are got up in excellent style, and at a very low price. For the instruction of children who have a taste for drawing, there cannot be anything better. Book K contains several perspective sketches, which will prove useful to the young student in architecture.

JOTTINGS.

Thomas Bridgford, R.H.A., has been elected as treasurer to the Royal Hibernian Academy, in the room of G. F. Mulvany, R.H.A., deceased.

Mr. John Neville has resigned the office of surveyor to the borough of Drogheda. His successor has not been appointed.

The National Gallery of Ireland will be open, free to the public, on the evenings of Mondays and Thursdays during the present month.

The sale of the large stock of building materials, &c., the property of the late Mr. T. H. Carroll, will take place on the 11th inst. Particulars will be found in our advertising columns.

MISCELLANEOUS.

THE USE OF REFUSE.—Among the more curious examples of the use of refuse, we may mention that album græcum is collected from the dog-kennels, for the purpose of cleansing the pores of goat-skins

previously to their being tanned for morocco leather. As many as fifty people, whose wages we are told are not less than £5,000 a-year, are employed in collecting the substance in the metropolis. The production of albumenized paper for the purposes of the photographer consumes a large number of the whites of fresh eggs, and consequently the yolks for a considerable time were considered a waste substance. In France, where they are very quick at utilizing any refuse-matter, a maker of "colifichets"—those yellow-looking unsubstantial articles, whether food for man or bird the Briton is at a loss to make out—was some years ago suddenly enabled to cut out all the rivals in his trade by the low price at which he sold them. After a little time the mystery came out; these "colifichets" are made principally of egg-yolk, and to provide this ingredient the clever Frenchman had made a contract with all the principal photographers for the cheap purchase of this refuse of their profession. In England the confectioners now obtain this substance from the same source. There must be a great abundance of it in the market, and in consequence cheese-cakes ought to be cheap; at all events, the price should depend upon the fluctuations of personal vanity. When there is a great run upon the photographers in fine weather, there ought to be a decline in this particular delicacy. Old and spoiled photographs themselves are a very valuable waste, in consequence of the amount of gold and silver they contain, which is recovered by simply burning them, and from the washing of the prepared paper they are secured by evaporation. The amount of refuse silver thus recovered amounted, in one large photographic paper establishment, to £1,000 in one year. Every refuse of the precious metals is most carefully collected. A jeweller's leather, old and well worn, is worth a guinea; and what are termed "sweeps," or the dust collected in the leathern receptacle that is suspended under every working jeweller's bench, is a regular article of trade. A worker in the precious metals can always obtain a new waistcoat for an old one, in consequence of the valuable dust adhering to it. Bookbinders doing a large business tell almost incredible tales of the amount of gold they collect from the floors and the rags of the binders.

Mr. Ericsson, a Swede, resident in New York, has long been known for his endeavours to improve the steam-engine, and to construct an engine in which heated air should be the moving power. Within certain limits he has been successful, and many air-engines from two to four horse-power are now at work in the States. Since then, Mr. Ericsson has turned his attention to the grand question of utilizing the sun's rays; and he states that he has devised apparatus by which the heat may be concentrated and used for steam or air-engines. In other words the solar radiation accumulated on a space 10 feet square and perpendicular to the sun's rays will develop somewhat more than one horse power. Hence the sunshine that falls on the roofs of Philadelphia would keep going 5,000 steam-engines of twenty horse-power each; and with this as a datum any one may calculate the amount of heat power which any given area of the earth's surface would represent while lit by the sun. And the calculation might be applied even to the sun, for, according to Mr. Ericsson, 10 square feet of the sun's surface emit heat enough to run an engine of 45,984 horse-power. After this, it is clear that all those gloomy forebodings about the exhaustion of our coal may be entirely dismissed.

IRISH BILLS IN PARLIAMENT.—Mr. Dodson, the chairman of the committee, has reported to the House of Commons that, in accordance with standing order 82, it has been determined, with the concurrence of the Chairman of the Committee of the House of Lords, that the following, among other Bills, shall originate in the House of Lords:—The Attery and Tuam Railway, the Dundalk and Geonore Railway, the Fermoy and Lismore Railway, the Great Northern and Western of Ireland Railway, the Loughlinstown Common Inclosure, the Midland Great Western Railway, and the Navan and Kingscourt Railway. The Holyhead Docks and Warehouses Bill is also to originate in the Lords. The Clontarf Township Bill, the Bill for the formation and improvement of Clontarf Township, comprising the districts of Clontarf, Dollymount, and Ballybough, in the barony of Coolock and County of Dublin, was read a first time on Tuesday, and now stands for a second reading.

A labyrinth of passages communicating with large chambers hewn in the chalk has been found at Guildford. In all, six rock-hewn chambers have now been discovered. Antiquarians differ as to the original purposes to which these chambers were applied, but there is some ground for supposing them to have been dungeons in connection with the castle, and to have been relinquished in the reign of Henry IV., agreeably to a petition from the inhabitants of Guildford. A number of bones have been dug up.

A system of metallic ceilings, which consists in the application to the joisting of very thin stamped metal in ornamental embossed panels, has lately been invented in the United States. These stamped panels are fitted for every kind of decoration in colour, and if inserted as plain surfaces may be used as the ground for every description of cartoon painting, combining with lightness and durability artistic and ornamental effect.

CURE FOR SMOKY CHIMNEYS.—A correspondent writes:—"Inflate a large ox-bladder with air, and tie it by the neck to the middle of a stick, which place across the inside of a chimney, about 2 ft. from the top, or at the foot of the chimney-pot. The buoyancy of the air keeps the bladder continually in a circular motion, and thus prevents the rush of air into the tunnel from descending so low as the fireplace."—Does it?

The *Mining Journal* says, we have reason to believe that it may be now considered definitely settled that the Irish Railways will not be purchased by Government—Mr. Gladstone having been outvoted at the Cabinet Council at which the question was brought forward. As an alternative, which met with some favour, it was proposed to grant a general permission to consolidate, regardless of the existing private Acts, but whether the railways of Great Britain will be included in the arrangement, or whether it will apply only to Ireland, is not yet settled.

Readers of Asiatic news are frequently puzzled by the occurrence of the terms sycee silver, when Chinese matters are alluded to. The term is simply "shoe silver" when translated into English. The Chinese do not coin silver as we do—or at least have not been accustomed to do so—but use the Mexican dollars as a medium of exchange, or sycee silver; that is pure silver run into little oblong cakes somewhat in the shape of a Chinese shoe, but more in form of an ordinary japanned or laquered bread-tray, one piece fitting into another, so that they may be put up in long rolls or sticks and readily fastened together. This silver does not pass for a fixed value, so much a piece like our money, but by weight, and merchants in the course of large transactions pay out or take in tons of it at a time. A small gold coin issued by the Chinese Government has recently made its appearance, and a copper coin worth one thousandth part of a dollar. Cash has been abandoned in the Empire for 1,000 years at least.

A builder has written to the *Times* as follows:—"I am very anxious that everybody should be told that it is only a question of time as to the certain fall of their own gaseliers, the consequent escape of gas, and a very probable explosion, so long as the weights which hold up gaseliers are supported by brass chains. Brass chain is sure to decay by the action of the atmosphere, and the only wise remedy is to discard the use of brass chain altogether, and to substitute copper chain in the place of it." To which Dr. Percy replied, "I have seen brass wire, about an eighth of an inch thick, after having been subjected to occasional vibration while stretched, become so tender and brittle in the course of a few weeks as to be capable of being easily broken into short pieces between the fingers. I have also seen the links of brass chains, which have been employed in suspending gaseliers, undergo a similar change, though in a less degree. These effects, so far as I have observed, have been due to spontaneous physical changes in the metal, and not, as your correspondent states, to atmospheric corrosion. It is well known that other alloys undergo singular spontaneous changes. Brass which has become tender and brittle may, by annealing, be rendered as tough and flexible as at first. It appears that only certain varieties of brass are liable to be thus affected; and if so the explanation will probably be found in the presence of foreign matters in small proportion. I have never seen copper become tender and brittle like brass."

A M. Jonglet claims to have discovered a process whereby he can obliterate the ink from newspapers, and convert them into sheets of virgin purity. The invention offers a field for boundless ingenuity and enterprise. Newspaper proprietors will be able to arrange for receiving back their papers from the agents, who will receive them back from the public, after making a small charge for the use of the paper. In fact, newspapers will be let instead of sold.

All Communications respecting the IRISH BUILDER, should be addressed to MR. PETER ROE, 42, Mabbot-street, to whom all payments for Subscriptions and Advertisements must be made.

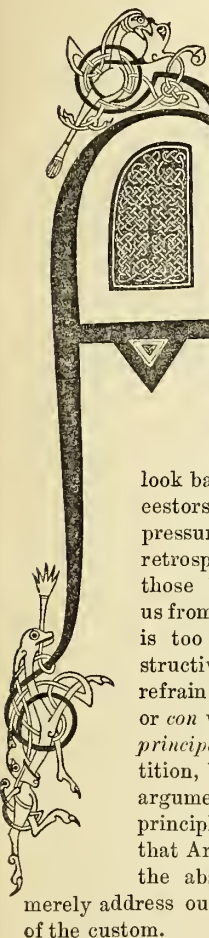
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The Irish Builder.

VOL. XI.—No. 222.

Architectural Competition.



AS to the principle of Architectural Competition, it is hardly worth while to enter into the enquiry whether it is a beneficial principle to the art or not, since it is so often adopted, and so largely responded to. We cannot help at the same time having doubts about its influence on the art, especially when we look back at the works of our ancestors. But in this age of high pressure there is small time for retrospections. Often, indeed, those backward glances prevent us from going forward. Precedent is too frequently made very obstructive. While, therefore, we refrain from too strong a bias *pro* or *con* with regard to the abstract principle of Architectural Competition, but suppose for the sake of argument, and somewhat on the principle of "whatever is, is right," that Architectural Competition in the abstract is proper, we will merely address our remarks to the practice of the custom.

At the very outset here, it cannot, indeed, in the face of innumerable facts, be said, that "whatever is, is right." On the contrary, by far the greater number of decisions given in Architectural Competitions are wrong. Of course we do not say that architects themselves are always free from blame, for the manner in which they engage in Architectural Competitions. It is at the same time true, in the words of the hackneyed maxim, that "two wrongs do not make a right." If one or many of the competing architects in a competition adopt a reprehensible course, it by no means justifies the committee, or body advertising the competition, in acting unfairly. It is but too true, that conditions of competition are often issued, which either contain principles which are dishonourable, or embody some latent quirk which may afford a loophole at which the originators of the competition may crawl out. Most of the conditions we see might be compiled in the office of Messrs. Quirk, Gammon, and Snap, considering the remarkable facility which they afford the framers in evading the liability of dealing fairly and honorably by the competitors. The free response with which these sort of conditions are often met by the designs of architects, without much enquiry, seems to give to those issuing them, and to the general public, a somewhat arrogant idea over the architectural profession. It would be well if people who institute Architectural Competitions would limit a time within which the conditions could be obtained, as well as a period within which designs would be re-

ceived. Architects responding to competitions, do so generally, on the expectation of some effort, at least, of fair dealing in the matter of adjudication, whatever looseness or apparent unfairness there may be in the conditions themselves. But although this may be the general feeling of architectural competitors, yet, we fear, that they, in many cases, view the matter as a "leap in the dark,"—a sort of hap-hazard—the throw of a die—if the originators of the competition stumble upon anything approaching to an examination of the plans sent in. And, as the conditions of competition so often betray a mean, not to say a dishonourable, spirit in the promoters, many of those who respond to them, appear to suppose that everything the competitor may do is allowable, so that competitive success is attained. Consequently, not content to stand on equal terms with their co-competitors, every species of private influence is incessantly used by these kind of gentlemen, to prime the members of the corporation or committee in favour of a certain design, not upon its merits as judged of with the rest, but solely on its own grounds. Of course it is not just to blame the conduct of the originators of Architectural Competitions, without at the same time censuring the unfairness of such procedure on the part of architects. But where conditions are loosely drawn, or where they contain some quibble by which, if so disposed, the committee think they may ignore the whole thing, it can hardly be expected that there may not be architects who, by hook or by crook, will not scruple to strain a point or so in order to obtain an undue advantage over their co-competitors. When this sort of policy takes place, it need hardly be wondered at if the advertising bodies sometimes yield to such importunity, like the unjust judge in the narrative, lest by continual comings of this kind they grew weary. Many a competition has thus been upset and ended in a scandalous piece of injustice, from the committee having been biassed in this way. It is not, perhaps, so much from deliberate partial dealing that so many competitions are thus made monuments of injustice, as from the fact that committees and corporations are not competent to judge in the matter. While they are delaying and hesitating, they seem relieved if one of the competing architects steps forward and steals a march on the other competitors, the labour of impartially examining the various designs being then in a measure, as the committee seem to suppose, excused.

So ends many a competition. Unless the moral tone of the Corporation be sound, competitors need not look for anything but the grossest and most vulgar trickery. If a jury were permitted to draw the bill of indictment against the person they tried, it would hardly be more unjust than for a committee, drawing the conditions of competition, to decide whether or not those conditions have been met. The injustice which is thus done to the architectural profession is most deteriorating in its influence. Whenever and wherever it takes place, architects lose caste—it is libellous. To suppose that a general committee or corporation are competent to decide on the merits of a set of competing designs for extensive buildings, would be most absurd. They themselves know it well. Bakers, butchers, and grocers—they are only too glad to shirk the whole thing when they see what a host of clever suggestions, totally beyond their appreciation or comprehension,

their advertisement has procured, and are glad to hurry back to the shop, the slaughter-house, or the store. But this sort of thing in the present day will not do. The people who obtain by advertisement a vast amount of study and matured thought, in the shape of numerous and various designs, as interpreting certain conditions issued, are bound to ascertain in the only way in which it can be ascertained, the order of merit in which those designs meet the requirements. In the matter of these competitions, an architect should be tried by his peers. The reverse is absurd. More; it is sheer barbarism.

MECHANICAL ARTS.

(Continued from page 56.)

WROUGHT-IRON.

THERE are various qualities of iron in general use, but there are two kinds differing very distinctly from each other in their nature; the one being used in the foundry, and the other in the forge. They are commonly known as "cast iron" and wrought-iron; cast iron is fusible and very brittle, and does not admit of its shape being altered by forging. Wrought-iron is very difficult of fusion, is tough, and can be wrought into any form by forging.

The first process in the manufacture of iron is the separation from the ore of the sulphur and other volatile matters contained in it, and which, if allowed to come into contact with the metal, while in a liquid state, would combine with it and deteriorate the quality of the iron. The volatile substances are dissipated from the ore by subjecting them to the heat of an ordinary coal fire; this is done by piling up into heaps alternate strata of refuse pit-coal and ore which are generally burned in the open air. The ore after this process contains all the earthy matter which could not be removed by the heat of an ordinary fire.

The next process is the separation of the metal from the impurities still contained in the ore. This is effected by fusing the ore or "mine" in a large furnace in which the metal sinks to the bottom, and the foreign matter floats on the top; they are then each run out of the furnace through separate apertures. The iron ore is melted in much the same way that cast iron is fused in the foundry, except that the air is generally heated before it is driven through the fuel. The ore requires about its own weight of coals to melt it, and yields about one-third of its weight of metal; of course, the result varies according to the quality of the mine. There is also about one-third the weight of the ore used of limestone which serves as a flux. The metal, as it issues from the furnace, is run into rough bars about 3 feet long, and weighing nearly a hundredweight each.

The rough bars run from the smelting furnace are known as "pig-iron," and are sorted into six different qualities, and numbered from 1 to 6. The numbers denote the quantity of carbon contained in the pigs. Nos. 1 and 2 are used for cast iron, and Nos. 5 and 6 are used for making wrought-iron. Nos. 3 and 4 are used for both purposes. No. 1 contains the most carbon, is the most liquid when melted, is of a dark colour, and is the softest and most malleable. No. 6 contains the least carbon, is the thickest when melted, is of a bright white colour, and is the hardest and most brittle. The other numbers take up intermediate

positions between these two, their respective qualities being indicated by their number. No. 1, on being melted, passes into No. 2, and on being melted several times it passes into No. 3, and so on at each melting getting harder and more brittle.

The next operation in the manufacture of wrought-iron is the refining of the pig-iron, by which process it is deprived of still more of its carbon and made exceeding brittle. The finery is a shallow furnace about 2½ feet broad, and 3½ feet long. The fuel is urged by a blast introduced through six tuyeres—three from each side. The furnace is surrounded by water. Six pigs are melted in it at each operation. The metal from the fining furnace is run into a plate about 2 inches thick, 2½ feet broad, and 10 feet long. The coke consumed in this process is from 4 to 5 cwt. per ton of iron.

The plate of "fine metal" from the finery is broken up into small pieces and sent to undergo another process in the puddling furnace. This furnace is of the reverberatory form, and is not supplied with a blast; but the air is made to pass through the fire, and escapes through a tall chimney. The draught is thus very considerable, but can be lowered to any desired degree by means of a damper placed on top of the chimney and worked by a chain. The hearth is situate between the fire and the bottom of the chimney, and the draught from the fire has to pass over the hearth in a horizontal direction. The hearth is about 6 feet long, 4 feet wide at the end next the fire, and tapers to about 20 inches at the chimney. A small bridge about 10 inches high is placed between the fire and the hearth. The fire-bars of the furnace are made so as that they can be easily removed. From 3½ to 5 cwt. of the fine metal is placed on the hearth at one time; while in this furnace the pieces of metal become clustered into a mass which is worked and stirred about by the workmen. When it comes to a certain stage the fire is lowered, and the metal is kept stirred until it arrives at a certain thickness and tenacity, when the heat is again turned on, and the metal removed in the form of balls.

The balls or "bloom," when taken from the puddling furnace, are put under large hammers; and after the hammers, they are passed between rollers while still hot, so that the iron at each successive rolling is gradually reduced in thickness, and increased in length. The metal has thus been converted from a hard brittle substance into a malleable bar which is soft, tough, and difficult of fusion, but it is still very far from being fit for the forge, as it is very irregular in quality and structure.

The next process is to cut up the bars with a powerful shears into various lengths according to the size of the bars to be produced. These cut bars of iron are carefully piled up in another furnace similar to the puddling furnace called the reheating furnace. In it the bars are merely heated a sufficient degree to admit of their being welded together, and adapted for reduction to the form of finished bars by the rolls.

The rolling is the last process in the manufacture of wrought-iron. The metal is drawn successively through a series of rollers, and thus gradually lengthened out into bars, and freed from the cinder and other impurities remaining after the puddle rolling. Sometimes the bars are recut, welded, and rolled in order to produce wrought-iron of superior quality.

PUBLIC WORKS IN TIPPERARY.

THE county surveyor of the south riding of the county Tipperary reported as follows to the grand jury at their meeting on Tuesday last:—

The bridge at Ballyhane, boundary of the north riding, is completed; but as some of the fences to the approaches have fallen in, I have withheld the last payment until they are re-constructed.

The new bridge of Ballyvistica, a long time in hands, has been opened to traffic for some time; but, as there are certain works which have not been executed in a satisfactory manner, I have withheld the last payment until the contractor carries out the term of his specification to my satisfaction.

The new bridge at Cromwell, upon the boundary of the county Limerick, half the expense of which falls upon the south riding, is also opened for traffic; but I have the same fault to find with the contractor in this as in the last case, and the balance in hands is likewise withheld.

The small bridge at Croane, in the barony of Iffa and Offa East, passed by the grand jury at last assizes, has been completed.

The new bridge at Bishopswood, near Dundrum, is finished; but it has been found necessary to build a wall of masonry in addition along the road, in consequence of the necessity for keeping open a small passage to the river. An application for a small sum was approved of at the last sessions at Dundrum. I would ask you to pass this presentment, particularly as the bridge, which was sanctioned for £200, has been contracted for at £165, and out of this Lord Normanton has paid £50 in aid.

There are no other bridges or any new roads in progress or under contract in the south riding.

Of the new Staff Barracks for the South Tipperary Regiment, I have to report that about two-thirds of the masonry of the store have been built. I had to suspend all mortar works for the past three months, but operations have now been resumed, and I expect that a great deal will have been done by next summer assizes. The removal of the old gaol has been a very tedious work; and as the main barrack building is to occupy the exact site of the old structure, in front of the street, an unavoidable delay has, in consequence, occurred.

The forty-foot arch upon the road from Newcastle to Clogheen, at Glengool, was completely carried away by the flood in a mountain torrent, upon the 12th August last. I applied for and obtained a presentment for £400 at the last road sessions for the barony of Iffa and Offa West. My estimate being £397, I have prepared a plan for a new bridge of a totally different character, and which I consider suitable in this case. I shall be able to satisfy you that it would not be advisable to re-build this bridge upon the old plan, either in an engineering or economical point of view.

I now come to a matter of serious consequence to the grand jury—viz., the *Trackway along the Suir*. With regard to this important work, I had the honour of reporting to the grand jury at summer assizes, 1861, as follows:—

"I have carefully examined the track bank along the River Suir, from Carrick to Clonmel, several breaches in which are now in course of repair; about two-thirds of the work being finished, and the remainder proceeding in a satisfactory manner. I think it right to inform you, with reference to this track bank, that it is in many portions (which are unprovided for in the specification for the present contract) in a very bad state. It was originally ill constructed, and is now much out of shape; several portions of the actual horse road lying considerably below flood line in winter. I therefore fear a constant expense for keeping up this bank to the barony of Iffa and Offa East, unless a very large sum of money were expended in remodelling the whole work."

Upon the same subject I reported at spring assizes, 1868, thus:—

"The sum of £450 having been presented to a committee of five magistrates, at last assizes, for the repair of the trackway along the navigation of the River Suir, from Clonmel to Carrick, I prepared detailed specifications and advertised for tenders for the work in three divisions; but, owing to the season, no contractor offered for the two lower and heavier divisions, viz., from Kilsheelan to Carrick. The committee, feeling the urgency of the matter, directed me to carry out the intentions of the grand jury, which I have done as far as possible. Ten heavy works of masonry are finished, and several portions of the bank trunked and metalled—some gulleys and drains made, while the navigation has not been interrupted, which was the main object the committee had in view. About £330 has been expended, and the balance will nearly complete the work in a satisfactory manner. As already reported to the grand jury, all works connected with this track bank are most expensive, from its peculiar situation and the great difficulty of obtaining materials."

And at last assizes I reported as follows:—
"The track bank along the River Suir—the repairs of which were ordered by a committee of the grand jury—have been carried out by me. They are now nearly completed, and within the amount originally passed for the work. The track bank has not been in so good a state for many years, and the works are all of a superior description. This is so far satisfactory, as no contractor could be found to tender for them, though repeatedly sought for by advertisement."

The accounts and vouchers for the whole of the expenditure, under the orders of your committee, are now laid before you.

Just about the time the grand jury was sitting at last assizes, and while the water in the River Suir was extremely low, certain persons undertook, upon their own account, and without either my knowledge or consent, to make what they supposed to be a series of clearances of obstructions from the bed of the river, to which I would not have made any objection, provided the work was properly executed, and under my immediate direction. Upon the 12th of August, and after the parties in question had carried on the operations for three or four weeks, a flood occurred in the River Suir, and it was reported to me that Poulakerry Quay wall was down. I proceeded at once to the scene, and there met by appointment some of the members of your committee—Mr. Lalor, D.L., Mr. Briscoe, and Mr. Scully, J.P.'s—and we found that about 300 feet of the wall had fallen in, and we also perceived that a great quantity of stones had been removed from the quay wall and from the footing course or foundation of the wall, and lay in a field of Mr. O'Donnell's, where they are still to be seen. A case has been laid before an eminent lawyer, and his opinion will be placed before you. I have had three first-class engineers to view the premises, whose reports I shall lay before you, as well as my own ideas as to how this serious injury to public property has been brought about. I obtained a presentment for £550 at the last baronial sessions, for rebuilding the quay wall at Poulakerry; but, having had an opportunity of examining the foundations while repairs were going on under magistrates' orders, I don't think that less than £800 will properly rebuild the wall, which was never a good work, either as to the quality of stone or mortar; and as the wall was placed in a peculiar and dangerous reach of the river, I would not feel justified in recommending to you anything but the most approved method of construction in this case. A very large quantity of heavy stone and rubbish can now be obtained at a low rate, out of the materials of the old gaol, and I submit to you an estimate of what I consider is absolutely required to be done at the present moment. I should also inform the grand jury that it is intended to apply to the grand jury of the county Waterford, at this assizes, upon the subject of the obstruction to the navigation, created by the stream called the Glasha

opposite the quay of Poulakerry; I will ask you to pass a resolution in support of the memorial to the Waterford grand jury, which can be laid before that body at the next summer assizes, when the application, at the May sessions, comes to be considered.

The county and sessions court houses, the county gaol and bridewells, are in good order and repair, with the exception of some trifling damages caused by late gales and the usual ordeal of winter. I must ask you to present at least £200 to the court house commissioners, for repairs and many etceteras as required. No money has been voted for this purpose since summer assizes, 1867.

J. LESLIE Worrall.

THE BELFAST SURVEYOR'S REPORT ON THE COMPETITION PLANS FOR THE MUNICIPAL BUILDINGS AT BELFAST.

AN unintentional contradiction was apparent in our recent article on this subject. We spoke of the surveyor's report as "entirely negative," and then of the "positive part of the report." These words should have read, the "principal part of the report." The report alluded to is, as we stated, "entirely negative." As a report, it is very misleading on this account. It purports to be a "report on the compliance of the designs submitted with conditions of competition," whereas it is a report on the alleged non-compliance of the plans with the conditions. It begins with throwing the whole of the designs out of court for "deviations from," "breaches," "transgressions," and "settings at naught" of the conditions, but still shows that only two conditions have been broken, and not even these two in spirit and ability. The Belfast Town Surveyor has completely overlooked the merits of the case. The more we consider the document he has produced, the more we are assured of its utter fallacy—not only on *prima facie* evidence, but from the several statements of architects who sent in designs, which statements have recently reached us.

There was one point to which we did not allude in our remarks on the subject, namely, that of the cost of the proposed buildings. The surveyor complains of the want of sufficient data to go upon in order to ascertain whether or not certain designs can be carried out for the sum named. Now, if the experience of many established architects is thus "set at naught," all fairness in the competition is also "set at naught." Surely the statements of numerous architects are of more weight than that of one town surveyor. If that functionary had doubts on the point of cost, it would have been the most natural and business-like course in the world to have suggested (what is now customary in such cases) the desirability of calling in some disinterested architect or architects. But what has been done is unnatural. The Town Surveyor seems to suggest that he has been made to pursue this unnatural course. He has stated publicly that he "has no feelings." The architects in this competition must appreciate this declaration. On our own part, much as we regret this absence of feeling, it is scarcely a sufficient excuse for the serious contradictions of his report, and for the gross misstatements of the "Town Hall Committee" of Belfast. On the contrary, had feelings of modesty and propriety existed where they ought to have existed—and where we hope there may after all be a latent spark—these grave absurdities would not have been committed. Surely the intrigues of the Belfast Town Council have not so steeled the heart and conscience of the Belfast Town Surveyor, that he now has "no feelings." Writing to the *Northern Whig*, he says:—"The Town Surveyor, like the editor,

has no feelings." Now, both that newspaper and also one of the opposite party in Belfast politics, have had the feelings of courtesy to open their columns freely to the discussion of this matter, so that the meaning of having "no feelings" cannot be understood in that sense. As to the Town Surveyor of Belfast comparing himself to the editor of the *Northern Whig*, why the compliment to that gentleman comes with the purest irony. The political opinions of the *Northern Whig* are Liberal; the Belfast Town Council is Tory. True, it has now got a Liberal Mayor, and may in time be liberalized, if the present Government retains office; but there was not a more uncompromising opponent in the field to the cliquery of the Belfast Town Council at the last general election than the *Northern Whig*, and still that organ raises its voice against the narrow injustice that both municipally and politically, in its opinion, characterises the Belfast Town Council.

Professionally we hold no partizan feelings in politics. A town surveyor, even if he had "no feelings" in this respect, would be totally unlike the editor of a public journal, for the editor necessarily has most decided party views, as well as feelings of impartiality with regard to the merits of all that comes within the sphere of his duties and the range of his observation. The fact of it is, that although the Belfast Town Surveyor wants to shake hands with the editor of the *Northern Whig*, he knows he belongs to a corporation whose politics and whose principles are most decidedly unlike those of the *Northern Whig*. But perhaps the Town Surveyor wishes to liberalize the council. They have got a Liberal Mayor, and perhaps all the subordinate officers see the desirability of assimilation. Perhaps. But surely if they do see this desirability, they might have begun the exercise of liberal and just principles in this non-political matter. If they persist in the mean and shameful course they have begun, there is no doubt but a more intense odium, if possible, than ever, will attach to the savor of their name. Whatever political bias might hitherto have assisted the grovellings, or now animates the spirit of the Belfast Town Council, as a motive of instigation to their shabby dealings, it was with faith in fair play in the matter of this competition—so purely technical and apparently free in its early stages from taint of jobbery—that the competing architects entered the lists to the number of thirty, only to find out that the Belfast Town Council is not only a nuisance of political and municipal obstruction, but seems to have a hopeless and deplorable peccant eccentricity even on matters of art and science; to defy both the citizens—by whose suffrages it has obtained its position,—and, if it were possible, even the county at large, and the domain of art and science. These men seem to have an irrepressible desire to turn the world upside down. Political and municipal mountebankism seems to infect nearly all they say and do with a stage-struck air of farcical or tragical lustrism as the case may be, and as the forte of each member for comedy, tragedy, or farce may find scope. "Instead of deserving any innuendo of this kind" for meddling and peddling with this matter, the Belfast Town Council, no doubt, takes credit to itself for "careful consideration." It has "no feelings;" but although its surveyor may suppose "it is well that this is so," we believe that this stupidity will prove to be very ill. *Au revoir*.

THE LATE SIR EMERSON TENNENT.

ONLY a few days ago (says the *Athenaeum*) this once active and well-constituted man, who had fought his battle of life with success and honour, was abroad in health and strength, but with the shadow of death hanging over him. Near his own town residence, in Eccleston-square, he was suddenly smitten. It was one of those deaths which is indeed a sort of euthanasia to him whose mantle is adjusted for the fall, but which brings a double grief to survivors.

The late baronet emphatically belonged to

the workers. He was of the stuff of which the best of them are made. A thorough Ulster Irishman, he was descended from an old North of England family, the Emersons, and, in lucky hour for his fortunes, he married the well-dowered heiress of the Tennents,—Scotch by descent, but Irish by long settlement; and Mr. Emerson not only took the lady, but her name and her house also. Tempo Manor, county Fermanagh, was only a part of her inheritance. The whole was of the quality which gives such interest to the only daughters of prosperous bankers. A prosperous merchant's son, like Mr. Emerson, was every way worthy of matching with such a mate.

But Emerson Tennent devoted himself neither to commerce nor to banking, which, indeed, is but a sort of commerce,—the buying and selling, and warehousing and venturing of money. He turned to statesmanship and literature. Belfast and Lisburn might fairly be proud of such a representative. Sir Robert Peel soon discovered for what other work he was fit than legislative task-work in the Commons. The Minister made him Secretary of the India Board; and he fulfilled the duties of that office so well that, immediately on opportunity offering, Emerson Tennent received the high and responsible appointments of Colonial Secretary and Lieutenant-Governor of Ceylon. He went to his far-off field of service with the additional dignity of knighthood, which was conferred on him by Her Majesty. The honour thus laid upon his shoulders was as much in testimony of service done, as by way of stimulant to do more for his country. During his residence in Ceylon, Sir Emerson designed an exhaustive work on the social, political, religious and natural history of that magnificent island. He can scarcely be said to have accomplished all he designed; but his "Christianity in Ceylon," published in 1850, and his more recent "Ceylon: an Account of the Island," are admirable proofs of what the author might have done if he had had the leisure.

The first work is especially good, for it treats its subject with admirable skill, and has as much novel matter on Buddhism and Brahmanism as it has of good common sense on Christianity. Sir Emerson thoroughly understood those subjects in reference to the people, as he did the people themselves. In their new and old religious feelings they fully illustrated the difficulty, the natural hesitation, that a really pious man has in forsaking the gods he has been taught to love, and turning unreservedly towards a new and sole Deity. The Singhalese amused Sir Emerson by their dexterity in this respect. They united both forms of faith, as they adapted new fashions to their old boats. They went afloat in the old bottoms, but ostentatiously used Christianity in the form of an outrigger.

We are inclined to believe that Sir Emerson Tennent's literary reputation will rest on these works; but he is the well-esteemed author of others, some of much earlier date than his "Christianity in Ceylon," and more attractive to many minds and readers. His account of travels in Greece, his Letters from the Aegean, his historical volume on Modern Greece, are all creditable to him as a writer and a scholar, and Greece honoured herself by making him K.C. of the Order of Our Saviour. His "Belgium in 1840" was less widely known; and his works on the "Copyright of Design" and on "Wine, its Use, and Taxation," addressed themselves to exclusive but highly-interested portions of the public by whom they were appreciated. At home, he served his country in other offices than those enumerated above. Sir Emerson was the very efficient Secretary of the Poor Law Department under Lord Derby. He resigned the post, however, for that of permanent Secretary to the Board of Trade. It was on withdrawing from the labours of the last office, in 1867, that the Queen created Sir Emerson a baronet. He had then attained his 63rd year, and full two-thirds of his life had been spent in the service of his country.

CELESTIAL PHOTOGRAPHY.*

I HAVE been requested to give a description of our experiments in celestial photography conducted with the great Melbourne telescope during its temporary erection at Dublin. This, from the limited number of experiments which it was in our power to make, I should have some diffidence in doing, were it not that the scale upon which they were conducted being altogether unprecedented, and their success, considering the temporary nature of the apparatus, to say the least, remarkable; an account of these experiments cannot fail to prove interesting to a large number of readers.

The experiments originated in the great doubts which had been expressed of the practicability of photographing with this instrument, without being provided with some huge scaffold apparatus to reach the mouth of the tube. The reader will recollect that the instrument (*vide Practical Mechanic's Journal*, Dec., 1868) is a Cassegrainau reflector, in which form the eye is applied at the lower end, while the photographic apparatus must be mounted at the upper end of the tube to receive the primary image as formed by the great speculum. This scaffold would require to be 35 feet high, and would be as unmanageable as ponderous.

My father considered the scaffold unnecessary, as the tube could easily be lowered to receive the plate, and raised again to position for exposure. This was objected to as taking for such an instrument a considerable time to effect, especially as the tube would require to remain stationary after being raised until all tremors had subsided before exposure of the plate. Therefore, these experiments were instituted to prove not only the possibility, but the great convenience, of working the photographic apparatus in the way my father originally proposed; in fact, it has been found that the slide containing the prepared plate can be placed in position, the telescope raised and pointed to the object, and all tremors allowed to subside, in less time than it would take a person to climb up 35 feet of scaffold—not to speak of the labor and even personal risk of such an operation.

It is but right to state that any doubts which had been entertained as to the practicability of such a course as I shall presently describe were immediately dissipated on inspection of the instrument; for, instead of the great labour which it was supposed would be necessary to work an equatorially-mounted telescope whose moving parts weighed eight tons, experience showed it could be moved by a child, and, as to time, ten or twelve seconds would run it up to the ordinary altitude of the moon, and two or three would be sufficient to allow all tremors to subside in the tube.†

So many popular descriptions and engravings of the telescope are now going the rounds of the illustrated and scientific journals, it is unnecessary for me here to enter into any details, except of such parts of the instrument as were especially designed for photographic operations. In these the clockwork of an equatorial telescope plays a very important part, and unless it be competent to do its work well, it is quite impossible to expect any success. The governing or regulating portion of the clock of the great Melbourne telescope is fully described elsewhere, so I may at once pass on to those parts which have reference to the adjustment of the speed.

The clock, in what we may call its normal state, is adjusted to carry the telescope at sidereal rate. But at a convenient part of

the shaft which connects the clock with the telescope this shaft is divided, and by means of a system of six differential wheels—three on the shaft and three on the countershaft—the simple movement of a lever changes instantly the rate of the telescope from sidereal to mean lunar, the rate of the clock itself remaining undisturbed.

For the final adjustment of rate, either to that of actual lunar rate *pro tem.*, or to that of the governing part of the clock, the latter is provided with an apparatus actuated by a lever traversing by hand over a graduated arc, which affords the means of making the final adjustment for rate in all cases with extreme accuracy. By this arrangement it will be seen that all alterations of rate in movement, either great or small, are made almost instantly, and without stopping either the clock or the telescope.

In adjusting, finally, a tentative process was used; but it is proposed to draw out a table of the values of the divisions corresponding to the motion of the moon, as given in the *Nautical Almanac*, and then both adjustments may be made instantly by reference to the *Almanac*.

No provision was made for counteracting the motion of the moon in declination. It was at first proposed to attach a piece of mechanism for this purpose; but the exposure proving so very short (about two seconds) it was then considered unnecessary, as the greatest movement during that exposure would not be more than 0.00066 of an inch.

The apparatus which we attached to the telescope for the photographic operations was of the most temporary character, and it is unnecessary that I should describe it particularly here, as I hope soon to be able to communicate a full description of the very complete apparatus we are at present constructing to follow the telescope to Melbourne.

The temporary apparatus consisted mainly of a tripod frame, partly iron and partly wood, which was bolted to the upper end of the lattice tube, the apex of which stood out about 2½ feet. On this was mounted a sliding tube with rack and pinion, carrying a frame into which the *châsse* of a photographic camera slid. Through the body of the sliding tubes the day eyepiece of a telescope was inserted, which could be brought to a focus on the plate from behind. There also was mounted in front of this frame, and quite independent of it, a flap shutter, which could be worked by a person on the ground with a pair of strings and parallel levers attached to the lower end of the tube.

We had heard so much of the necessity of procuring chemicals very pure and in very perfect order, to obtain even moderate rapidity, and having only taken the precaution of fusing the silver for the bath, and in other respects using our ordinary chemicals, the first picture I exposed thirty seconds on a three-fourths moon, on January 11. This being quite overdone, I tried successively fifteen, ten, five, two, and one, and finally settled on one and a-half second as the best exposure. But then arose another difficulty. If sufficient exposure was given to bring out the faint details of the terminator, the brighter edge was completely overdone. On January 27, two plates were exposed on the crescent moon, but nothing satisfactory was obtained, owing to a considerable mist; but on February 1, we arranged the shutter so that we could expose the faint terminator as much more than the bright edge as we desired. The actual practice of the operation was as follows:—

Some time during daylight the eyepiece (which acts the part of a delicate focussing glass) was adjusted to correct vision on a piece of fine ground or collodionized glass, placed in the position of the prepared plate in the dark frame; when sufficiently dark the telescope was pointed to some bright star, which, being low, or for some other reason, proved convenient. On looking through the eyepiece, the image of the star was seen on the collodionized or ground glass. This then was brought to the best focus by the rack and

pinion, and clamped by a pair of tightening screws.

The telescope was then turned on the moon, and the clock adjusted in its rate by the apparatus before alluded to. The telescope being accurately pointed* to the moon, was then unclamped and lowered in declination until the upper end came to a convenient height for a person to take out and put in the dark frame. The plate being prepared and inserted, the telescope was raised again in declination to position, which operation required about ten to twelve seconds. This required no movement in right ascension, as the clock had in the meantime been carrying the telescope in that direction. About five minutes were allowed to elapse to ensure the total subsidence of any tremors in the tube, and then the lever for opening the shutter was slowly and steadily moved, the operator watching the process through the hole in the large mirror.

By arranging the shutters as before described, the exposure of the several parts was quite under control, and, while the faint terminator was given two seconds' exposure, the bright edge got only from a quarter to a half second. The telescope was then lowered again in declination and the dark frame taken out, and a fresh plate inserted. In this way about one dozen plates could be exposed in an hour with one assistant. The chemicals, with the exception of the fusing of the nitrate of silver for the bath, were the ordinary ones of everyday use—collodion bromo-iodized, iron developer fifteen grains to the ounce, and pyro. of two grains to the ounce for intensifying. Great care was necessary to keep the image from getting too intense.

As regards the relative capabilities of this telescope and Mr. De la Rue's for photographic purposes, the size of image given in Mr. De la Rue's telescope is equal to 1½ inch, that given by the great Melbourne telescope equals 3½ inches, just three times the diameter and nine times the area; but the area of the speculum of the great Melbourne telescope is thirteen and a-half times that of Mr. De la Rue's, and therefore the image, although nine times the area, is about one-half more brilliant.

Such are the results we have so far obtained; but we do not wish it to be understood that we consider the photograph referred to to be the best, or anything like the best, that can be produced with this instrument; for it should be remembered that the apparatus was quite a rude and imperfect one, and our work with it has been that of days, not years, so that it affords but a very imperfect idea of the magnificent results that may be expected when the apparatus is in working order, under M. Le Sueur.

A few words as to these results, and the probability of any improvements, may not be amiss here.

I believe it is a conceded fact that no photograph that has ever been taken of the moon has revealed those finer details and test marks familiar to a practised observer on a fine night. It will be interesting to investigate the cause of this. In the first place, we have a certain amount of "structure" or "texture" in the collodion, which, when the photograph is magnified or enlarged to an extent sufficient to see these delicate details, seriously interferes with the detection of such, even if they should be there; hence one of the advantages of using a large telescope and getting a large primary image, which, of course, does not require so much enlarging to bring it to the same amplitude as the smaller. There are two directions, therefore, to be followed in surmounting this difficulty: First, the obtaining of a collodion as structureless as possible; and, second, the working with a telescope as large as possible in order to obtain a large primary image.

The next difficulty we come to is the great difficulty of the celestial photographer. I refer to the unsteadiness of our atmosphere. The effect produced by this unsteadiness in the atmosphere is but too well known to any persons who have worked with even moderate

* By Howard Grubb, C.E., M.R.D.S., Mem. Inst. C.E.I. Extracted from *Practical Mechanic's Journal* for March.

† Necessarily, as in the Cassegrain construction, the secondary image (received at the lower end of the telescope) is so much enlarged, and consequently diminished in intensity, as to render it insufficient for photographic purposes.

‡ Some assertions which have appeared in a London contemporary relative to the stiffness of the tube could only have been made in profound ignorance of engineering science. If the reader would care to form an idea of its rigidity, I can give him these data. The tube being horizontal, 112 lbs. was hung at its end, 25 feet from the point of support. The deflection thus produced = 0.005 inch; and I may also mention that its rigidity appeared so remarkable to a civil engineer who inspected it, that he afterwards adapted the same principle in a design for a portion of a lighthouse.

* This was effected by means of the finder telescope.

sized telescopes, but the difficulty increases rapidly with the power of the instrument. I wish, however, to show how this affects the photographic operations more than the visual observations. The effect of this unsteadiness on looking through a telescope has been compared by some to that produced upon objects (such as pebbles at the bottom of a brook) by running water, by others to that produced by the proximity of any heated body; but whatever it may be compared to, the effect is that of an undulatory wavy motion of the several points of the object. Occasionally there seems a slight lull, so to speak, and objects are seen more clearly, and sometimes for one single instant a glimpse is obtained of amazing clearness, which the next moment is swallowed up in a mass of vibrations. Hence, then, we can see how it is that this unsteadiness interferes more with the photographer than with the visual observer. The object may be considered to be to a certain extent in motion; such motion does not interfere much with visual observations, but I need not tell photographers that it does so sadly with photographic observations.

Again: the eye is able to eliminate (if we may use such a term here) one fine moment, if there be such, in the whole period of observation, while we must consider the photograph as a fair average of the condition of the object during exposure. If the unsteadiness of the object were simply a matter of motion or vibration, there is no doubt that, if we could diminish the time of exposure below that of one vibration, any further diminution would increase the distinctness of the resulting photograph.

That it is not purely a matter of motion is very evident, but that this character enters largely into the question there can, I think, be but little doubt. This would tend to show that it is desirable to reduce the exposure as much as possible. Such reduction, however, I consider would have little or no effect until a certain point be reached, determined by the rapidity of the vibratory motion. For example: suppose you wished to photograph a seconds pendulum in motion. It is very evident that, whether your exposure were one, two, three, or a hundred seconds, the moving pendulum would be equally confused in the photograph; but if you reduce the exposure to one-half, one-fourth, or one-eighth of a second, you will have respectively twice, four times, and eight times the distinctness. On this point I quote the words of Mr. De la Rue, who, from his great and lengthened experience on the subject, must be considered the first authority. "I am persuaded," he says, "that the proper direction to be pursued in developing astronomical photography will be to increase the aperture of the instrument in relation to its focal length, and to diminish the time of exposure as much as possible by always improving the chemical part of the process."

Whether this great increase of sensitiveness will ever be obtained is a "nut for photographers to crack;" but if this great rapidity cannot be obtained for the moon, there is no reason why it could not be obtained in the case of the sun, when the difficulty lies in the excess of light. As regards the other matter mentioned by Mr. De la Rue, viz., increasing the angular aperture, I have already shown that we have done something towards accomplishing it, the image of the great Melbourne telescope being about one-half more brilliant than Mr. De la Rue's; but the difficulty of accomplishing this increases much with the size of the instrument.

One more point I would remark on. Referring to the rarity of those favourable moments of observation, it will be readily understood that many photographs may be taken without catching one of those moments. Hence it is greatly to be regretted that there is not some means set on foot to produce photographs of the moon systematically on every possible opportunity. M. Le Sueur may, and will, do much with the great Melbourne telescope, for the nights upon which the moon is a conspicuous object are the worst for his nebular work; but it is surprising that

in England, where so many gentlemen have telescopes adequate for the work, so few have taken up this interesting branch of the photographic art.*

THE SALT MINES OF CRACOW.

POLAND, as every one knows, was formerly an independent sovereignty, existing from an early date. At present its ancient territory is divided between Russia, Prussia, and Austria. The city of Cracow, once the residence of its kings, now belongs to the latter power, though the products of the celebrated salt mines of the region are shared with the two others, in certain proportions stipulated by the treaty of partition. These salt mines, the most renowned in the world, are situated about eight miles from the city of Cracow, having their mouth or principal entrance in the pleasant village of Wieliczka, which lies on the slope of a wooded hill, and is very picturesque. The superintendents of the mines reside here, and their dwellings, together with the government offices and large storehouses for salt, occupy a pretty eminence, and are conspicuous from a distance. A great many people from various countries visit these remarkable excavations, and are well rewarded for their trouble. Every year for many centuries having added to their depth and extent, these mines are now of immense and almost inconceivable magnitude. In order to visit them the traveller must procure a permit from the government, which is easily done, the proper officer being on the spot. The opening, or square shaft, through which the descent is made is covered by a building or office; and here the visitor is dressed in a long, coarse, linen blouse, to protect his clothing while under ground. A door is opened, and he goes down by stairs, preceded by boys who carry lamps, only to make the darkness more visible. Or, if he is so disposed, he can descend by the windlass and ropes suspended in the centre of the shaft. More frequently visitors descend by the stairways and come up by the ropes. No salt is seen for a depth of more than two hundred feet; then the veins begin to appear in a bed of clay and limestone. Fifty feet further down the stairs terminate, and the salt is everywhere; nothing but salt; overhead, under foot, on every side are dark grey masses of solid salt, whose points and surfaces sparkle in the lamp light. Galleries now branch off in all directions. Lights twinkle, and groups of labourers are seen hacking the floors or removing in wheelbarrows blocks that have already been cut out. Passing on through one of these galleries, a chapel is reached, which is only the first and oldest of many apartments thus designated, differing only in size and decorations. It is called the Chapel of St. Anthony, and is supported by columns of salt left in quarrying the solid rock. It has an altar, crucifix, statues of saints large as life, all of pure salt. The air in this part of the mines, near the surface, is much more moist than that of the deeper excavations, so that the process of dissolving goes on slowly, and in consequence some of these statues of salt are gradually losing their shape. The head of one is nearly gone, the limbs of another, while deep furrows are observable in many places upon their bodies, making them present a very grotesque appearance when lighted up for exhibition. The smoke of the torches and lamps, added to the dampness of the air, blackens the surface of all objects not recently cut, so that these statues might be mistaken for black marble. Onward and downward goes the visitor, through halls, chambers, tunnels innumerable. Stairs descend lower and lower, and similar apartments reappear, till he loses all sense of distance or direction; blindly following his conductors, who point out, from time to time, localities or objects of peculiar interest, where all is surpassingly wonderful. Everything is solid salt, except where some in-

secure roof is supported by huge timbers; or a wooden bridge is thrown over some vast chasm from which thousands of tons of salt have been quarried and removed. The air grows drier and purer the deeper you go; the points and faces of the rock more crystalline and brilliant. One enormous hall, out of which has been cut a million hundred-weight of salt, has the appearance of a theatre. It is over one hundred feet high, and the blocks, taken out in regular layers, represent the seats for the spectators. In another spacious vault stand two obelisks of salt, which commemorate the visit of the Emperor Francis I. and his Empress. Further on you come to a lake more than twenty feet deep, intensely salt, of course, which is crossed in a heavy square boat. In this you are paddled through a tunnel which connects two immense halls. While in the middle of the tunnel the walls behind you and before you are brilliantly lighted up, and a gun is discharged which, with its echoes and reverberations, almost deafens you. Both air and water tremble visibly under the strange and frightful concussion, and you are only too thankful to reach the end of your voyage and stand once more on solid salt. Francis Joseph's ball-room is another of the wonders of this subterranean world. It is an immense apartment, both in height and extent, and on some festive occasions is used for dancing. It is lighted by six chandeliers, which resemble cut glass, but are in reality of crystalline rock salt. Statues of Vulcan and Neptune, sculptured from salt, also adorn this hall, which, when well illuminated, exhibits a marvellous splendour, the light being reflected from innumerable brilliant points and angles of the glittering rock. Down, down, down, hundreds of feet further, through labyrinths of shafts, galleries, and chambers, crooked passages, vaulted archways, and openings which have no name and seemingly no end. Groups of miners, naked to the hips, are everywhere busy with the implements of their labours; pick, mallet, and wedge are employed incessantly in blocking out and separating the solid mass. Their manner of work is the same simple process in use centuries ago, perhaps by the remotest ancestors of these very men, in these very mines, for they are immensely old. The blocks are marked out on the surface of the rock by grooves. One side is then deepened to the required thickness, and wedges being inserted under the block, it is soon split off. It is then divided into pieces of a hundred pounds each, and in this shape is ready for sale. It is removed in carts or barrows to the shaft, where it is hoisted up, stage after stage, to the surface. Horses and mules are employed, and it is said that some of these animals are born and raised in the mines. The number of labourers constantly at work is from one to two thousand. They all live outside the excavations at the present day, although traditions exist of times when the families of some of the miners had their abodes in these fearful depths, and where children were born and reared to the occupation of their parents, seldom or never visiting the outside world. The thing is neither impossible nor incredible, as the air in the lowest part of the mine is considered more salubrious than in their upper regions. But the practice was long ago discontinued, if it ever existed to any extent. The miners, who are fine, muscular, and healthy-looking men, are divided into gangs for work, and relieve each other every six hours. A gang will quarry in that time about one thousand hundred-weight. The temperature is very even all the year round, and the preservative power of the air is such that wood never decays, but retains its qualities for centuries. People with pulmonary affections are said to have been much benefited by inhaling freely the atmosphere of the mines. When and how this wonderful deposit of salt was originally discovered is unknown. It was worked in the twelfth century, and how much earlier none can tell. Some traditions are held by the ignorant and superstitious

* The photograph of the moon referred to above, and also a series illustrative of the great Melbourne telescope, are being published by Messrs. Pumphrey Brothers, of Birmingham.

peasants of the country, which ascribe the discovery to miraculous or supernatural agency. Others say that a certain Queen of Poland, on visiting the spot, commanded her subjects to dig there, assuring them that there was a most precious treasure beneath them. After a while a crystal of salt was found, which, as an earnest of the abundance afterwards discovered, this princess had set in a ring, as a royal gem, and wore to the day of her death. The extent of the deposit has not yet been fully ascertained. It commences, as we have before stated, about two hundred feet below the surface, and has a solid depth of nearly seven hundred feet, and rests on a bed of compact limestone, such as forms the peaks of the Carpathian Mountains, which it seems to follow. It has already been explored to the continuous length of two miles and a-half; and it is estimated that the aggregate length of all the innumerable excavations of these mines amount to more than four hundred miles!

VILLA AT DUNDELA, BELFAST.

AMONGST the many improvements around the metropolis of the North of Ireland, we, this week, give a view of a gentleman's residence, which stands in a commanding position on the rising ground overlooking Belfast Lough. It has been erected for N. Ferguson, Esq., of Belfast. The views from the windows of the principal rooms are very fine. The grounds surrounding the house are tastefully laid out. The house contains dining room, drawing-room, library, smoking room, dressing rooms, 10 bed-rooms, nursery, lavatories, water closets, &c. The servants' offices comprise kitchens, scullery, pantries, bed-rooms, with back stairs, &c. Stabling and coach-houses are in the rear.

The building is most substantially executed in red brick and Cookstown stone. The internal ornamentation is well and boldly executed. Altogether it forms a most desirable residence. The views of the Lough and neighbouring mountains, the position and aspect of the house are very delightful. The architect is W. Hastings, Esq., Belfast.

BUILDERS IN LITIGATION.*

It would be of considerable use to the trade if some competent person were to publish a small work containing a clear and simple exposition of the law as applying to builders. Scarcely a week passes without the occurrence, in some of the legal tribunals, of cases which show that, as respects several matters, there is a good deal of uncertainty or misunderstanding as to the bearing of the law on matters which relate to building transactions. We have always been careful to give an account of all which have come to our knowledge, even the reports of local county courts and police sessions being most of them examined every week for this purpose. The file of the *Circular*, therefore, contains, as regards this subject, a mass of information which is only partially to be found elsewhere. Being, however, scattered through so many numbers, this matter is not ready to hand just when it might be of service in a particular case, and, were it otherwise, no tradesman would be able to apply it for himself. In litigation, some peculiarity of fact generally characterises every suit. It is consequently impossible in many instances to find a clear guide in past experience. Nevertheless, certain general rules are easily to be stated, and, if they will not determine exactly what is the liability in a disputed position, they will at any rate suggest the precautions which should be taken with the view of guarding against disputes. We make no allusion here to the great legal questions which affect the relation of employers and employed, or those which concern "ancient lights" and the numerous

rights and interests connected with property. What we refer to are the incidents specially pertaining to building as a trade—incidents which may arise any day in the business of a builder. The following examples will illustrate our meaning.

There have been innumerable actions turning on the question whether, in reference to the supply of goods, the payment of wages, or the giving compensation for accidents, the liability rested with the sub-contractor, the contractor, or the owner of the property. Decisions of this class of cases have had no fixed basis, but have expressed merely the opinions of judges and juries, as to the special circumstances disclosed. Perhaps we may say that actions have usually been brought, not against the man most justly responsible, but against the one considered best able to pay. Goods are supplied, perhaps, to a sub-contractor, who fails, and straightway application for payment is made to the original holder of the contract, who will be fortunate if he succeeds in making a valid defence. The observation applies equally to the non-payment of wages by a defaulting sub-contractor. In all these cases, though the law, when invoked, is pretty certain to fall harshly on one side or the other, the danger of litigation might be in a great measure averted if clear and definite arrangements were made and announced in the first instance.

Another frequent cause of dispute is the want of a certain rule as to the responsibility for work which proves, after it is executed, to be unsatisfactory. When a builder works under the orders of an architect, it might be assumed that his liability for defects would cease from the moment when his account had been certified for final payment, but nothing could be more delusive than such an assumption. We have lately reported from Edinburgh cases in which the builders have been held chargeable for errors of drainage arrangements coming to light years after houses were erected. The great Irish trial,* again, afforded an example of quality of work being disputed, notwithstanding its being strictly in accordance with the specifications supplied. The "moral" of these cases is that builders should well understand before entering upon a contract whether or not they are to be answerable for what is done wrong when they really do only what they are told.

Notwithstanding its frequent use, it appears to be still uncertain what is meant by the term "quantities supplied." We recently published the report of a county court case in which a builder, on applying for the balance of his money, was refused payment because he had omitted to execute work which was not included in the quantities. The judge sided with the builder, but the architect and lawyer, on the part of the proprietor, contended that the contract had not been fulfilled though every item set down had been faithfully carried out. A little care at the outset would always prevent the occurrence of a misunderstanding on this point, but the "little care" is apt to be considered beneath notice.

A good deal might be written on the subject of accidents happening at works imperfectly protected. Builders and proprietors are in the habit of believing that, because the ground they occupy is private, persons who go upon it being trespassers, have no one to blame but themselves for the mischief they may sustain. The doctrine, however, is anything but universally applicable. It has often occurred that little children at play have met with injuries in yards or works open to public access, though in every other sense private. In such cases, a jury will scarcely allow a builder to shield himself behind the law of trespass, as it is clearly his duty to take care that, where his works are liable to be attended with danger to the public, they be properly fenced off. The like rule applies to the stowage of building material in a road which, though private as a matter of property, is customarily used by the public. Builders have frequently been declared answerable for accidents arising in such a locality.

The point is rarely contested, but we suspect that there is not unfrequently material for dispute as to the liability of the parties to a building contract. The great Irish suit offered an illustrative case. There the builders had contracted to erect a church for a gentleman who, at the time, was the head of a religious community, but who afterwards denied his liability on the ground that he had withdrawn from the position, while his successors equally repudiated the claim as having been no parties to the engagement. The question in such a case would be, whether the contract was official or personal, and whether, on the former supposition, the responsibility attached to the subsequent holders of the office, though a spirit of honour, would usually induce committees of charitable or religious societies to insure payment of money honestly due to a builder, it is easy to conceive cases in which recovery at law would be attended with difficulty, if a dispute on some other question caused every possible technicality to be raised in defence.

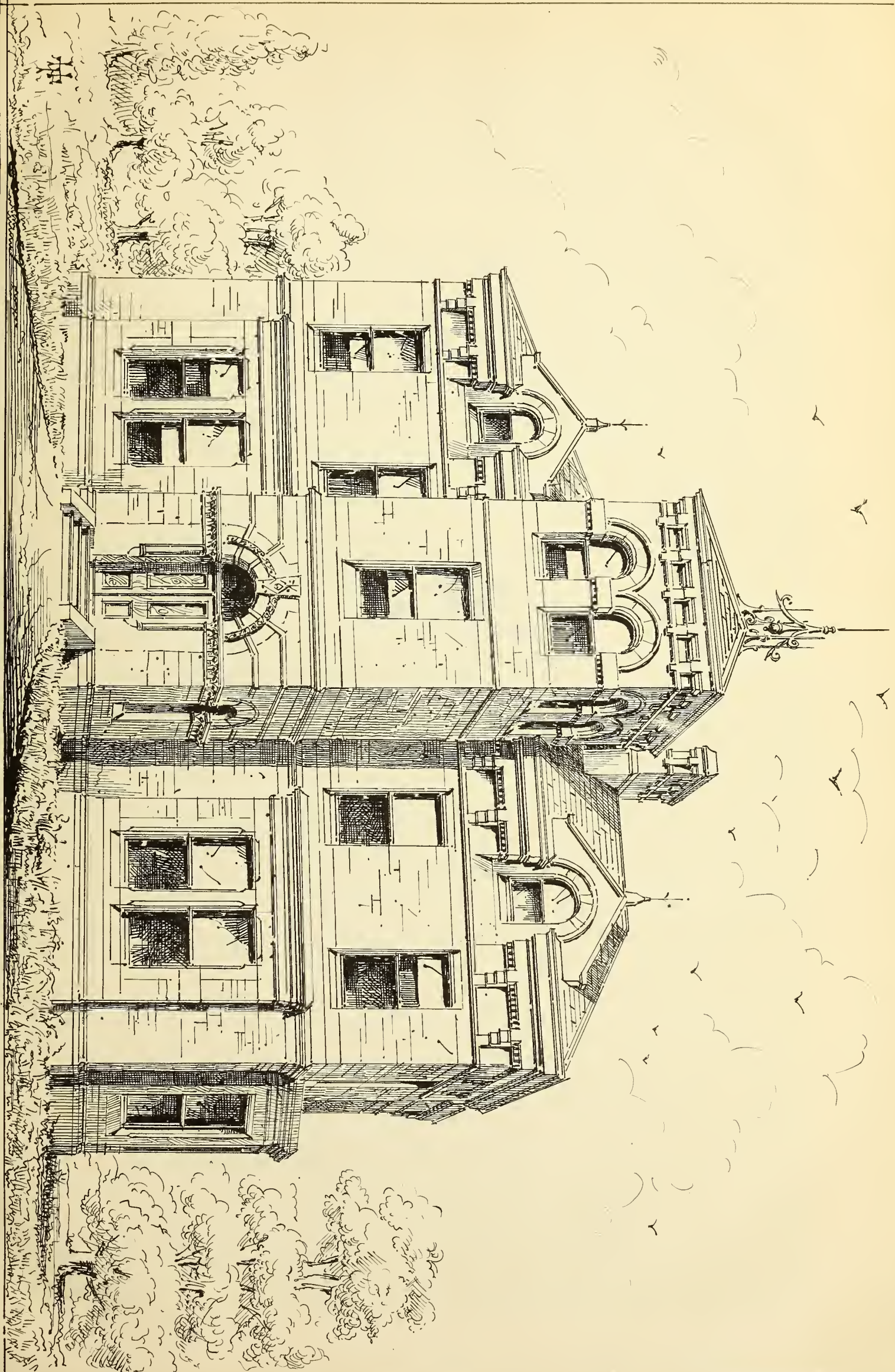
Misunderstanding, as to the responsibility of builders to municipal councils or local boards are almost of daily occurrence, and are often attended with unexpected consequences. One builder gets the approval of the official surveyor, and proceeds with his work in the belief that everything is right, but a court of law casts him in damages a year or two afterwards, because his "permit" had never been entered on the minutes of the board. Another is fined for fixing his scaffold poles in the footpath without formal permission, although he had obtained proper authority to erect the building. Cases such as these teach us that too much caution cannot be exercised where the provisions of an Act of Parliament are capable of being applied. The list of illustrations might be greatly enlarged, but these will suffice to indicate both that the builder is a man peculiarly liable to be "shot at," and that absolute safety is, in his case, only to be insured by a thorough knowledge of the law, and a careful stipulation with the employer as to the nature and limit of his responsibility.

LAUNCH OF AN ARMOUR-CLAD FRIGATE.

ON Saturday afternoon there was launched from the building-yard of Messrs. R. Napier and Sons, at Glasgow, a twin-screw iron armour-clad frigate for her Majesty's navy. The *Audacious*, as the new frigate was named, has been built from the designs of Mr. Reed, Chief Constructor of the Navy, and is of the following dimensions:—Length between perpendiculars, 280 ft.; breadth, extreme, 54 ft.; depth, moulded, 36 ft.; burden in tons, old measurement, 3774 19-94ths. She is to be fitted with twin-screw engines of 800 horsepower collectively. The general structure is similar to that adopted in the construction of recently built ships for her Majesty's Service, the framing consisting of a strong but light combination of longitudinal and transverse frames, with a double bottom, formed by working upon this framing an inner and an outer skin of plates, the whole being strongly rivetted together and made thoroughly watertight. The effect of this arrangement is to insure that if any damage is sustained by the outer skin the water thereby admitted is confined to a small compartment between the inner and the outer bottoms, and is not allowed to get into the ship proper, while by a complete system of drain-pipes, communicating with powerful pumps, any leakage can be easily surmounted, and the ship in every part kept free of water. The usual transverse watertight bulkheads are likewise fitted throughout the vessel, these being provided with sluice valves and water-tight doors, &c. The decks are exceedingly strong, having a covering of steel-plating rivetted to the beams beneath the usual planking, thereby imparting great longitudinal strength to the vessel, besides affording the necessary security against penetration of the decks by plunging shot or shell. The armament is intended to consist of ten 12½-ton guns—six on the main

* From the *Builders' Trade Circular*.

* A full report of this case was given in the *IRISH BUILDER*, Nov. and Dec., 1868.



VILLA ET DIGNOTA ET NAR AN MONTI X

Wm. Hastings, Architect

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and four on the upper deck—together with four 64-pounders on the upper deck. The guns will be concentrated within the ship, and effectually protected by a very strong armour-plated battery, occupying the central part of the ship, and so arranged, by projecting slightly beyond the vessel's upper works, as to afford ample space for conveniently working them, at the same time giving a clear range for firing, not only in broadside fashion, but also right ahead or right aft, if required. This battery will accommodate six of the heavy guns on the main deck, and four on the upper deck, all of which can be brought into play at once, and when necessary four of these guns can be trained forward or aft, thus securing the advantages of the turret system without some of its disadvantages, and forming an arrangement much superior to turret vessels as frequently built with fore-castles or deckhouses, which obstruct the range of the guns. The armour-plating is of great thickness, and is so disposed as effectually to protect the most vulnerable parts of the vessel. A broad belt of armour is wrought on in the vicinity of the water line, no less than eight inches thick (except at extremities, where it is gradually lightened), and other parts of the sides and the battery are covered with 6-inch armour, having a backing of East India teak, ten inches thick, supported by a double thickness of plating an inch and a quarter collectively, with strong girders and internal frames. The Messrs. Napier have also in hand, and will launch shortly, a sister ship to the *Audacious*, to be named the *Invincible*. They are also constructing the *Hotspur*, a vessel on an entirely new principle as regards the British navy. Its chief novelty consists in a fixed tower or turret, strongly armour-plated, to protect the armament, which, we understand, is at present intended to consist of one immense gun, to be trained from port to port of the turret by a strong revolving turn-table. The armour-plates amidships will be no less than eleven inches thick. Several vessels of the same construction are understood now to be building for the navy of France.—*Broad Arrow*.

NOTES OF WORKS.

A parsonage house, with suitable offices, has just been completed at St. Saviour's, near Portadown. It has been erected at the expense of Mrs. Bacon, of Rich-hill Castle, landlady of the soil, and whose sister built the beautiful St. Saviour's Church adjoining. The parsonage is built, to correspond with church, with black stone, having freestone dressings, projecting roof with ornamental verge boards and hip-knobs. The cost is over £1,000. Messrs. Boyd and Batt, of Belfast, architects; Mr. John Collen, builder, Portadown.

A small Gothic church for the Presbyterians is nearly completed in Portadown, at a cost of nearly £1,000. The same architects and builder.

A warehouse has just been completed in Great Victoria-street, Belfast, nearly opposite the Ulster Railway Station. It is very substantially built, having a piled foundation, faced with white brick; mansard roof, with ornamental cresting; fine entrance door of cut stone, with a quantity of carving on same. The cost was nearly £3,000. Messrs. Boyd and Batt, architects; Mr. James McCracken, builder.

A villa in the Italian style, at a cost of £2,600, has just been completed in Fortwilliam Park, near Belfast, for Hugh White, Esq. It is built of brick, having a large quantity of cut stone as dressings, quoins, cornices, string courses, &c. Same architects; Messrs. Martin and Son, builders.

A large addition is being put to the Roman Catholic Church, Roscommon, from plans by Messrs. Goldie and Child, London. The cost, including sundry internal improvements, will be about £1,000. Mr. Michael Farrell, Roscommon, is the contractor.

Mr. George McCutcheon, C.E., has been

appointed as clerk of works for the new public offices in Armagh. They will comprise post-office, income-tax, and telegraph offices, and will be erected in Russell-street. In announcing the appointment of the above-named gentleman, a local journal has the following:—"From Mr. McCutcheon's experience in the Australian colonies, the committee have confidence that the work will be carried out under him to their entire satisfaction. Mr. James Hughes, of Charlemont, is the contractor."

The building on west side of Capel-street (formerly occupied and known as the "Scot's Church," Mary's Abbey), and the premises connected therewith, were some time since purchased by Mr. Patrick Boland, fancy bread and biscuit baker. The old church has been converted into a bake-house, affording space for eight capacious ovens of the newest and most approved construction, and fully equal to any to be met with in the kingdom. The old dwelling-houses which occupied the portion of the site fronting Capel-street, will be replaced by buildings of an ornamental character, and suitably fitted up for trade purposes. The available frontage is about 60 feet. When these premises are completed, they will form an attractive feature in this portion of a leading thoroughfare, particularly from their contiguity to the extensive warehouses of Messrs. Edmundson and Co., gas engineers and brass founders, which they immediately face. Mr. Charles Geoghegan, is the architect.

Catholic Institution for Deaf and Dumb Boys, Cabra.—The foundation has been laid for extensive additions to the main building, consisting of a refectory, 75 feet by 32 feet; chapel over same, of similar dimensions, and 28 feet high, with sacristy; principal stairs, and separate entrances. The completion of the eastern wing of the original design is also about to be commenced, which, with the chapel building, will extend the south front to the length of 250 feet. The additions will be of Tudor character corresponding to the existing building. The contract has been taken by Messrs. Hammond. Mr. Mr. Charles Geoghegan, architect.

College of St. Stanislaus, Tullabeg, King's County.—The church is to be enlarged, and an Italian campanile added at south-west angle. There are in course of erection a spacious refectory, 69 feet 6 inches by 30 feet, with minor offices; student's chapel, 83 feet 6 inches by 31 feet, and 26 feet high; lavatories; and grand stairs uniting new building to eastern wing. The building will be constructed of limestone from the quarries on the property, having the quoins and all ornamental features executed in same materials. When complete the entire block will exhibit a southern façade of 193 feet, and eastern flank of 220 feet, three stories in height, of simple and effective character. Charles Geoghegan, architect.

NEW PATENTS.

C. G. JOHNSON, Stockton-on-Tees, "*Kilns*."—For the purpose of burning bricks or like articles they are placed on the top of trucks and then run into a long flue or kiln fixed from the top or sides, the trucks are made flat on the top, and these flat tops form the bottom of the kiln, the axles and wheels of the trucks being below, or the bricks or other articles may be placed upon a sledge sliding upon guides or rolling on fixed rollers, the guides or rollers being like the wheels. For drying bricks or like articles, they are placed on similar trucks and passed through a drying chamber surrounded, or partly so, by flues through which the heated gases from the kilns are led. On the tops of the trucks are clay slabs 2½ in. or more in thickness, to protect the metal work of the trucks from the heat of the kiln. According to one arrangement the bricks or other articles, as they are moulded, are placed on trucks running on rails, which pass through a drying flue heated as above described. The trucks enter the flue at one end, and when the bricks or other articles are sufficiently dry the trucks are passed out at the opposite end; the bricks or other articles are then loaded on to other trucks to be burnt; these bricks are carried on trucks running on rails, which pass along in front of a series of kilns, so that the trucks

upon which the bricks or other articles to be burnt are piled may be brought in front of any of the series of kilns, and then run off the trucks that carry them on to lines of rails that pass through such flue or kiln, or any other convenient arrangement of points and crossings, or turn-tables may be employed to convey the bricks or other articles from the machine to the drying flue, and thence to the kiln, or from the machine to the kiln. When a flue or kiln has thus been filled up from end to end with trucks the kiln is fired through holes in the top, beginning at one end of the kiln and gradually passing on to the opposite end, so as to drive forward the heat together with the smoke and moisture from the bricks or other articles, and the heated air and smoke is by means of a chimney drawn by return flues up the two sides and middle of a drying chamber in which the articles are dried before being burnt. The firing of the kiln having commenced at one end, is continued by degrees to the other, the amount acted on at one time being regulated by dampers applied to openings from the kiln into the flues.

J. GILL, Palermo, "*Engines*."—This invention consists in improvements in the construction and arrangements of certain parts of the mechanism of heat motive engines. First, in steam engines and also in engines working by the expansive energy of other hot elastic fluids. The inner surfaces, exposed to the contact of the working steam or other hot fluids, are covered with enamel or glass, fused directly on to the metallic surfaces, which are preferably prepared with shallow undercut grooving or otherwise roughened, or furnished with indentations or projections, to hold the vitrified coating more firmly in place. Or the surfaces are protected from contact with the working steam by covering them with metallic enamelled plates, or plates of glass, baked earth, or natural stone laid in cement, impervious to steam, and held in place by screws, clamps, or equivalent contrivance, instead of a mineral covering, as above mentioned. Secondly, in steam engines the temperature of the interior rubbing surfaces of the cylinder is kept up, for keeping in direct contact with these surfaces, as much as possible, a moveable mass of steam constantly at or near the full boiler pressure on one side of the piston or pistons, while the working steam is undergoing various stages of expansion from full pressure to the vacuum in the condenser on the other side. This is effected by making the cylinder longer than what is usually required for a given length of stroke, preferably about double that length, and using a long double-headed piston or two pistons firmly connected together. The space being in free communication with the boiler, and preferably forming a passage for the whole working steam on its way to the inlet valves, is constantly occupied by steam of full pressure and temperature, which, moving alternately from end to end of the cylinder by the action of the engine, communicates heat to the solid surfaces in contact with it, while, at the same time, the other portions of the cylinder walls are undergoing a fall of temperature from the expansive working of the steam on the one hand and its exhaust into the condenser on the other. Thus the unavoidable fall of temperature in the cylinder from expansion and exhaust is in a great measure made up by the direct contact of this steam bath with the inner skin of the cylinder at each stroke, just before the fresh steam is admitted for the succeeding stroke. Thirdly, to shorten the time during which the hot fluid may exert its energy in propelling a piston against some given resistance in steam engines, the steam is admitted at a pressure exceeding that of the atmosphere under a light independent piston in a sudden puff or blast, so regulated by the action of the inlet valve as to propel this flying piston rapidly to the other end of the cylinder, where it meets the piston proper connected with a crank and appendages for rotary motion, as in a common single-acting or atmospheric engine, having in its outward course expelled from the cylinder the atmospheric air through a line of apertures parallel with and a little lower than the under edge of the piston proper at its upper dead point, and therefore open during the ascent of the flying piston, which passes over, and so closes the apertures at the top of its stroke. The valve is held down by a spring adjustable from the outside, stronger than the atmospheric pressure on the valve against a vacuum, and communicating through a sliding (telescopic) or flexible tube with the condenser or otherwise with a separate small vessel or space made vacuum by the working of the engine, so that the thin stratum of air remaining between the pistons after the apertures are closed acts as a momentary cushion to the flying piston, preventing injurious concussion, but still allowing this piston to strike the tail of the valve projecting slightly below the bottom of the piston proper, and thus open a passage to the condenser or other vacuum space, through which the air rushes out, and the pressure of the working steam in the cylinder—which, though expanded to a low tension at the end of the flying piston's stroke, is still higher than that of the vacuum on the other side—urges the flying piston still upwards, and thus brings the pistons together, and keeps them in temporary contact.

FURTHER DISCOVERIES AT JERUSALEM.

THE following interesting letter from Lieutenant Warren is published by Mr. Grove in the *Times* :—

At the northern end of the Haram Area at Jerusalem, east of the gate known as Bab Hytta, are two tank mouths, which were not examined by Captain Wilson; they are closed by heavy stones. To the west of these there is a private garden which projects out into and forms part of the Haram Area; in this garden there are two other tank mouths. I examined one of these some months ago, but was unable to get down the other on account of the small size of the opening. On Monday last I went again to this garden to have another try at these cisterns, and first examined that to the west, which is simply a tank about 8ft. by 15ft., with a semicircular arch over it, and no appearance of rock about it. I then went to the other, situate at the south-east angle of the little garden, which at this point is elevated about 10ft. above the Haram Area. On sounding I found it 42ft. down to the water. I tried to descend, but to no purpose until I had nearly stripped to the skin, and even then in my contortions I managed to slip the rope over one arm; the narrow passage was only for 3ft., and 10ft. from the surface I came on the floor of a little chamber, about 6ft. square, apparently on a level with the Haram Area. The shaft down to the cistern continues through the floor of this chamber, and is a moderate-sized opening. On getting down to the water, I found it only three feet deep, and, concluding from the size of the cistern that help would be required in measuring, I signalled for Sergeant Birtles to come down.

On lighting up the magnesium wire, and looking about me, I was astonished, my first impression being that I had got into a church similar to that of the cathedral (formerly a mosque) at Cordova. I could see arch upon arch north and east, apparently rows of them.

After floundering about for some little distance, however, I could see that there was a limit to the sub-structure, at no great distance to north and east. In the meantime, Sergeant Birtles (somewhat stouter than myself) was making great efforts above, with very little result; do what he would he could not get past the narrow opening to the cistern, and at last had to give up the trial, and go and get leave from the owner to pull down the upper mouth of the shaft, and then he very soon appeared at the bottom, his shoulders considerably injured through his exertions. In the meantime the excitement of our "find" begun to wear off, and the water felt cold. I was just giving the sergeant some sage advice as to how he should direct his steps to the best advantage, when I stumbled over a large stone and fell into the water flat on my face. As just at present the weather is frosty, a bath in one's clothes is anything but pleasant. I found the stones on which I stumbled to be about six in number, averaging 7ft. in length, and 3ft. in depth and width. I could see no inscription on them, and they appear to have fallen in by accident.

The sub-structure, now used as a tank, is 63ft. from north to south, and 57ft. from east to west, thus being nearly square. Its northern wall is nearly 23ft. 6in. from the south side of the Birket Israil (traditional Pool of Bethesda). It consists of nine rectangular bays formed by four piers, cruciform on plan, equidistant from each other, and from the walls, from which spring arches. The arches between the piers, and between the two northern piers and walls, are stilted or pointed; those from the two southern piers to the walls appear to be flying buttresses, unless the remainder of these arches are concealed behind the east, west, and south walls of the sub-structure.

The dimensions of arches and piers all vary somewhat, which may arise from the thick coat of plaster which exists up to the top of the arches, that is, to about 14ft. above the floor of the tank. These arches support

nothing; they merely strengthen the piers and resist any lateral thrust against the side walls.

The whole of the sub-structure is covered in by vaults intersecting in groins over the bays; surface-ribs (of the stone) are thrown over from the piers to the sides, the remainder of the arches being composed of rag-work. The vaults are pointed; the springing of the vault surface-ribs is 14ft. above the floor of the sub-structure, and the cement does not reach higher than that point. The vaults from springing to crown are also about 14ft. in height, giving a total of 28ft. from the floor to the crown.

In the south wall is a staircase leading up to the surface of the Haram, which, I understand, has been open within memory. Near the bottom of the steps is a shaft leading up to the entrance, and in the centre bay is an opening leading up to another entrance. There is no appearance of an open continuation of these vaults in any direction. There is an opening on the northern side about 2ft. in height and 1ft. wide, on a level with the top of the cement, which lets in light, and, on examining the pool Birket Israil, I find a grating in the south wall (two feet square) exactly opposite the opening in the sub-structure, and which undoubtedly communicates with it, but whether directly through the thickness of the wall, or whether through another chamber in the wall, has yet to be determined. Through this opening any superfluous water in the sub-structure would flow into the Birket Israil. The impression that I had got into a church still remains on my mind, I do not exactly know why; the vaults are so unlike any known tanks in Jerusalem, and so very different from the sub-structures at the south-east angle of the Haram Area. I cannot believe such a structure as this was built merely for a tank, and if it was simply to support the present surface of the Haram, then there is probably more of it to be found to south and east.

We were altogether three hours in the water measuring, and I measured everything I could get at.

The vaults look small when compared to the Birket Israil in section, but then the Birket is really an enormous reservoir, nearly 100 feet deep.

The large stones I found huddled together at the bottom in the water are, I think, evidence of the roof having once fallen in and been replaced.

THE CITY FIRE ENGINES AT SUBURBAN FIRES.

The Corporation v. P. George.

At the Northern Divisional Police Court on Thursday, Mr. O'Donel gave his decision in this case, which had stood over from Saturday. Plaintiffs sought to recover £15 for the use of fire-engines, &c., and £2 17s. actual expenses incurred at a fire which broke out on defendant's premises at Clontarf, some time ago, and which lasted for six hours. The claim was resisted by Mr. W. Findlater on behalf of the Royal Insurance Company, with whom the defendant was insured, and in defence alleged that the charge was excessive. In giving his decision his worship reviewed the circumstances given in evidence, and cited the 10th section of the "Dublin Corporation Fire Brigade Act, 1862," which empowered fire-engines to go beyond the limits of the city to extinguish fires, entirely at the expense of the owner of the premises in which the fire takes place. This was the first case which had been brought before his worship under the act, and therefore he had no precedent. He had studied the rates of charges handed in by both parties on the last day, and he thought it an extraordinary thing that there was no uniform rate of charges established. In Edinburgh and Glasgow the charge was merely for actual expenses incurred, and 25 per cent. over and above the expenditure account, for the usage of the engines, &c. In Manchester there was a uniform time rate, at £3 per hour for

everything—that was, engines and service. In this case the amount legally due under that arrangement would be £18. In Birmingham there was no charge made by the insurance companies where the premises were insured; and, when not insured, only the expenses incurred were taxed. His worship thought the uniform time charge preferable to any other arrangement. Having referred to the charges in a number of other cities, his worship said he thought the public should be made aware before-hand of the extent to which they became liable by employing the Corporation engines. Firstly, by a uniform time rate; and secondly, by a bill of particulars, charging so much per hour for the services—so much per hour for the officers and men engaged. On the whole, his worship believed that 30s. for the first hour, and 10s. for every succeeding hour would be a fair amount for the services of the large steam-engine, which Captain Ingram had stated cost nearly £800; and £1 for the first hour, and 7s. for every hour after for the large lever engine. He would give Captain Ingram 3s. for each of the six hours engaged, although his worship said he believed it insufficient for a gentleman who had to peril his life throughout an entire night. The brigade would receive 1s. per hour per man, and the supernumeraries at the rate of 6d. per hour per man. This his worship thought a reasonable charge for the machinery used and services rendered.

After some discussion, it was agreed that Captain Ingram should receive 10s. for the first hour.

Mr. Findlater said that the insurance company pressed very strongly on the question as to whether Captain Ingram or the Corporation got the money so allowed.

Captain Ingram said that it went to the Corporation. He thought something should be allowed for the use of 700 yards of hose employed. In the city, for the last eighteen months, no engine had been required at all to work the hose, on account of the high pressure on the water supply, and therefore the hose could not be considered a part of the engine.

After some discussion,

Mr. O'Donel allowed £1 for the use of the hose. The whole amount therefore awarded would be £13 18s. 6d., and his worship wished to state that he and the parties interested gave the increase in the amount of compensation to Captain Ingram in the hope that the Corporation might give him remuneration to the same extent. The public might in future consider the scale of charges already mentioned as established.

ARCHAIC ANTHROPOLOGY.*

THE object of anthropology was not to prove the ape origin of man, as was generally supposed, but to study the natural history of man as he was and as he is. Its present position resembles astronomy and geology in their early days, when they had to battle against popular prejudice and hereditary lines of thought, and like them will triumph. Paleontology has revealed, that the past life on our globe evidences an orderly succession and progression in the arrival of its numerous species, more an ideal than a perfectly continuous lineal series, as many blanks occur in the gallery of nature, "missing links" which may or may not be recovered. Yet there are enough facts to prove the transition from species to species, as the law of the animal kingdom. How does this law operate? is man's legitimate inquiry, and as no law of nature is revealed, it must be sought for in nature itself; and just as Kepler pursued the planets through many circles and curves before he discovered their true elliptic orbits, so many theories will be exhausted before the secret law controlling animal series is arrived at. The doctrines of transcendental anatomy first brought forward by Oken and Goethe, that all animals are formed on one great plan,

* From paper read on the 4th inst. at meeting of Belfast Naturalists' Field Club, by J. S. Holden, M.D., F.A.S.L.

was accepted by Cuvier and elucidated by Owen, while Darwin, to explain the continuity of the plan, started the bold theory of natural selection. Given unlimited time, the first created animal or prototype, developed into every phase of life, crossed the impassable chasm between the vertebrata and invertebrata, and ever evolving upwards, rolled through fish rodent and monkey into man. The anthropologist accepts Darwin's facts, but not all his fancies. Man's place in nature, when viewed anatomically, is certainly next door to the anthropoid apes—though Professor Huxley has done much to bring about a reconciliation—still we don't fancy the relationship. We claim the Bosjesman, but we repudiate the gorilla. He has not our opposable thumb; his eye-teeth are like tusks, and his brain is not half the size of the little Bosjesmans. It is quite possible that some thousands of years ago the distance between the lowest man and the highest ape was less than it is now, as forms of both have become extinct. It is a singular fact that the large apes of Asia as the orang, and the large apes of Africa, as the gorilla and chimpanzee, differ from each other by the same characters which distinguish the men of these two continents, viz., colour and cranium. The orang is brown and round-headed, like the Malay. The gorilla and chimpanzee are black and long-headed, like the negro; yet it does not follow that Darwinism should come in and allow these apes to climb to the top of our ancestral tree. Referring to the antiquity of man, Dr. H. said that marks of his presence are now found prior to the glacial period, as flint implements and weapons in the upper pliocene beds, and even some traces have been discovered in the miocene. During the quaternary period he was contemporary with the extinct mammoth and cave bear, and has, to our surprise, left us in the debris of caves in France and Belgium, carving and sketches of the reindeer and other departed animals much superior to the crude designs on Celtic monuments of a vastly later date. Dr. H. gave an interesting description of the earliest human crania (inferring the savage condition of man in the mammoth and reindeer periods), also of the Danish kitchen middens, tumuli, the Swiss lake dwellings, and the late researches among the long and round barrows of England. In conclusion he showed that the three great race types of the present day were linked with the distant past. The black, yellow, and white, or Negroid, Turanian, and Caucasian. The Negroid type representing man of the Palæolithic age, distributed over South Africa and parts of Polynesia, at a time, says Huxley, when those remote lands formed one continuous tropical continent—if this be so, this primitive type is of an antiquity so vast as to confound calculation. The Turanian—a higher race—probably drove the last to the South, afterwards to be driven itself from Europe to the north and east of Asia. Archaic anthropology, though still in its youth, declares the vast antiquity of man. No more can the age of the human species be numbered by years, unless by years the geological strata and fossil fauna along with which man has left his remains can be reckoned. No more can the dawn of humanity be assumed as a golden age of virtue and intelligence, but as a stone age of barbarism and savagery. Nevertheless, man takes the highest place in the organic series of progression, subject to the inexorable laws of nature. As on the vast ocean of time successive waves of types and species have risen and fallen, have come and gone, so man has appeared, lived, and disappeared; race has followed race, and races like species have their day and no more. We see the dark races of the world declining before the exterminating march of civilisation; the Caucasian is now dominant—for how long? Past analogy may indicate the future; and nature seemingly—

"So careful of the type, but no,
From scarp'd cliff and quarried stone
She cries—'a thousand types are gone,
I care for nothing, all shall go.'"

THE ROYAL DUBLIN SOCIETY.

THE sixth evening Scientific Meeting of the session will be held this evening at eight o'clock in the Society House, Kildare-street. G. J. Stoney, M.A., F.R.S., will read a paper "On a Universal Money of Account, and the Natural System of Coinage."

Preparations are being made for the annual spring cattle show to be held on the 13th prox., and three following days. Besides the live stock, which usually forms the most prominent feature in the spring shows, a collection of agricultural implements, machines, and appliances of rural industry, seeds, manures, and other articles of a like nature, will find space in the building.

CORRESPONDENCE.

It is to be distinctly understood, that although we give place to letters of correspondents, we do not subscribe editorially to the opinions or statements set forth in same.]

BELFAST MUNICIPAL BUILDINGS.

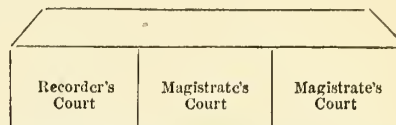
TO THE EDITOR OF THE IRISH BUILDER.

SIR,—As a competitor in this competition I submit that there is a great injustice done to the architects who have sent in designs. According to a local journal sent me, I perceive that a committee called the "Town Hall Committee" have selected a design which is not in accordance with the printed conditions under which (as I suppose) the competitors generally prepared their plans. The last copy of the printed conditions which I received is dated 12th Nov., 1868. Now if there were others issued subsequently to that date, I did not receive them; and—considering that those dated as above were not sent until I had spent considerable time with my designs, according to the first conditions, issued prior to the date named—I think I have just cause of complaint against the Belfast Town Council for damages in the matter. As far as I can gather, the design selected is chosen on a principle not named to the other competitors. The last copy of conditions to which I refer has upon it the word "amended" written in red ink. I claim the right of objecting to the decision made, on the grounds both of the labour expended on the first conditions, and also for the expenses attending the design on the amended conditions. The Belfast Town Council seem not to know their own mind. If they have made a selection on fresh grounds to those named to the other competitors, the affair is a complete shuffle—no better, in fact, than obtaining goods under false pretences. I have no wish whatever to reflect on the design selected, which, for aught I know, may be very suitable to its purpose. The Belfast Town Council, however, cannot thus evade their liability to deal fairly with the other competitors. Perhaps I am premature however; still, from the nature of the report of the committee, I cannot avoid the supposition that there has been foul play. I perceive from a circular received that the Belfast competitors are taking the matter up. In the interests of the profession, steps must certainly be taken to put matters right.

COMPETITOR.

SIR,—I have read your article on the extraordinary termination of this competition, and am glad that we possess an organ so capable of defending our rights. There is one point to which I crave leave to call attention, namely, that of the *grouping*. It struck me that the expression in the Belfast Surveyor's report, "set at nought," was not only most ridiculous, but, to use only mild terms, conveyed, and seems intended to convey, the reverse of the fact. This setting at nought it appears is found in nine designs. Now as to setting at nought the grouping, I can certainly say that, as far as my ability in designing is concerned, the grouping was one of the chief, if not the chief, study of the design. As to the council's condition of grouping being "set at nought," the idea is preposterous, not only because there was no condition of this sort to set at nought, but because if any

competitor has hit upon a better sort of grouping than that seeming to exist in the mind of the Surveyor to the Belfast Town Council, the design is fairly entitled to rank accordingly. I see from the lithographs of the selected design that the three courts of justice are adjoining each other and under one roof, so:—



The magistrate's rooms, the jury room, &c., are, consequently, inconveniently, not to say absurdly, arranged. I can only say that if the buildings are erected according to this design, the Belfast Town Council will be guilty of one of the greatest follies of the day. I understand that the author of this plan has taken his drawings away, and is busily engaged in re-arranging them. What can the competitors on the spot be about? Surely, sir, a stop ought to be put to the dishonest manner in which this competition is being allowed to proceed.

MUNIS.

[The following letters, which were sent to the secretaries for the competing architects, have been forwarded to our office.—Ed. I. B.]

2, East Parade, Leeds,
Feb. 24th, 1869.

GENTLEMEN,—We are obliged by your circular of invitation to a meeting of the competitors for the Belfast Municipal Offices, and regret our inability to be present, in consequence of the long journey we should have to take, and the want of spare time. As we cannot be present, perhaps we may be allowed to express our views on the result arrived at by the Corporation, which, from the report in the *Northern Whig* of February 16th, appears to us most extraordinary; and the reasons assigned in the committee's report for withholding the awarding the premiums will not, in our judgment, hold water, as the committee have acted on a report by the surveyor, who sweepingly puts every design out of court for non-compliance with the *competition conditions*. We think the surveyor ought to be challenged by every competitor to shew in what respect the conditions have not been fulfilled, for on this rests the basis of the recommendation of the committee, to withhold the award of the premiums. So far as we are concerned, we had intended challenging that gentleman to shew us how and where we have not complied with the conditions; and we shall most certainly put this matter in a train for investigation unless the competitors act unitedly to obtain justice, which, we suppose, is all that is required in return for the study, labour, and expense in preparing our designs. We do not want to use hard words, but if the surveyor is to be held immaculate, we have a right to insist on having a published report from him on every individual design, in order that the defendants may have an opportunity of setting him right where he is wrong, which, in our own case, we must distinctly assert is unjustifiable, for in every particular we hesitate not to affirm that we have adhered most closely and strictly to the competition conditions. You are at liberty to use this letter as you may think proper.

PERKIN AND SON.

39, South Mall, Cork,
Feb. 25th, 1869.

DEAR SIRS,—I regret that it will not be in my power to attend the meeting relative to the proposed Municipal Buildings at Belfast; I hope some good will result from it. It certainly does seem most unfair that a plan should be selected which the committee of the corporation themselves state erred in the same manner as all the others which were rejected. As far as I am personally concerned, I do not see how I have transgressed the rules, but, in returning the plans I presume they will state it.

WILLIAM ATKINS.

The Irish Builder.

VOL. XI.—No. 223.

Painting upon Glass.*

THE church windows of the middle ages, which have escaped the numerous causes of destruction, may afford valuable assistance to the history of Art at that period; but it is neither in private collections, nor even in public museums, that the study of painted glass can be pursued. Those who are interested in the investigation should visit those cathedrals in which these large transparent pictures are preserved unblemished, and in which they produce so wonderful an effect. Yet, as in the fifteenth century, painting upon glass ceased to belong exclusively to churches, and was used in the decoration of windows in private residences, of public edifices, and the mansions of rich citizens, this beautiful art, which was entirely neglected for more than two centuries, now gives promise, through the noble efforts of the last few years, of being ere long restored in all its pristine splendour.

GLASS WINDOWS OF THE ANCIENTS.

The manufacture of glass is of the highest antiquity; but could the ancients, who were so well acquainted with the art of staining glass of various colors, of fashioning it into vases of every kind, of employing it in little cubes in the composition of mosaics—could they also prepare it in sheets? At what period was glass first used for windows? These are the first questions that suggest themselves to the authors who have treated on the history of painting upon glass; and until lately, a few texts of controverted interpretations were the only documents we possessed on the subject.

Those who would trace back the use of glass windows to the first century of the Christian era, derived their arguments from a passage of Seneca (Epist. 90.) and from the narrative left to us by the Jew Philo,† of his reception by the Emperor Caligula. Several philologists maintain on the other hand, that the words of Seneca and Philo, which are sought to be applied to glass, should be understood of a transparent stone, of a kind of talc, or of a translucent shell which the ancients made use of to close their windows.‡ Leveil, a painter upon glass, who has left us a very extensive work upon his art of painting upon glass, as far as possible, admits that he cannot give any authority from the passages of Seneca and Philo, in consequence of their doubtful interpretation; nor does Langlois,§ who has written an essay upon the painting of glass, admit that it was the custom to close windows with glass before the third century.

With respect to this epoch, there can be no uncertainty. Lactantius, a celebrated ecclesiastical writer of the beginning of the fourth century; St. Jerome, in his commentary upon the 41st chap. of Ezekiel; Prudentius, in his

poems, speaks of the employment of glass for the closing of windows, in terms which can leave no doubt of its being used at the time in which they wrote.*

Winckelmann had pronounced in favour of the first opinion, by affirming that he had seen fragments of glass in the window of a house at Herculaneum. Recent discoveries, made since Winckelmann wrote, have brought additional support to his opinion. In the excavations at Pompeii have been found fragments of panes of glass and window-frames, which are now preserved in the museum at Naples.†

The ancients were perfectly acquainted with the art of colouring glass: we shall give by and bye the documents which establish this fact. There was nothing, therefore, to prevent them colouring glass for windows as they did for their vases, many of which are of the finest colour; yet the fragments of ancient window-glass hitherto discovered are all white. At any rate it is certain that when, on the establishment of Christianity, the ancient basilicas were converted into Christian temples, the windows of these new churches were adorned with coloured glass. Emeric David, in support of this opinion, which he entertains himself, thus translates two verses of the description left to us by Prudentius of the basilica of San Paolo Fuori le Mura, built by Constantine:—

"In the rounded windows are displayed panes of glass of various colours; thus do the windows shine when decorated with the flowers of spring."‡

If in order to refer to a later time the use of coloured glass in churches, the fidelity of this translation has been disputed, and the "hyalo insigni varie" of Prudentius interpreted to mean mosaics, the writings of Gregory of Tours leave no doubt of the existence of coloured windows in the sixth century. Fortunatus, bishop of Poitiers, his contemporary, extols in several passages of his poems the brilliancy of the coloured windows.

In these brilliant glasses of various colours, there were yet no figures, no ornaments painted upon the glass; they were composed of a number of pieces variously coloured, each being throughout of a uniform tinge, and cut into different patterns, and arranged to form designs; these can only be considered as transparent mosaics.

COLOURED AND PAINTED GLASS.

In fact, there is a great difference between colouring glass and painting upon it. The coloured glasses are obtained by mixing metallic oxides with the glass in a state of fusion, by which means a uniform colour is given to the whole mass. This colouring is not superficial, it pervades the substance of the glass, the colouring matters becoming incorporated by fusion with the vitreous mass. This process produces what is called stained glass, which must not be confounded with painted glass; to obtain the latter, the artist makes use of translucent glass, either colourless or already tinted in the mass, and gives the design with vitrifiable colours upon one or both surfaces; these colours are the product of metallic oxides, which give the colour combined with vitreous compounds known by the name of fluxes; these fluxes serve as vehicles for the colours, and it is through their medium, assisted by the action of strong heat, that the colouring matters

are fixed upon the glass and incorporated with it.

The charm of the brilliant mosaics, of the glasses of the first ages of Christianity, very naturally induced the wish to trace upon them figures and subjects; but the question, at what period this art of glass-painting with vitreous colours was first introduced, has not been less the subject of controversy than that concerning the first use of glass for closing windows.

Theophilus, the learned monk, in his "Diversarum Artium Schedula,"* has devoted thirty-one chapters of his book to the art of glass-making and to that of painting upon glass, and if the publication of this treatise had been as early as the ninth or even the early part of the tenth century, the inference from it would be conclusive that painting upon glass was known at the time of Leo III., 816. However, a careful study of the book of Theophilus has led to the general belief that it cannot have been written before the twelfth century. This treatise cannot then be appealed to in favour of the opinion which would place the discovery of painting upon glass at the middle of the ninth century.

It is a fact now generally acknowledged by all archaeologists, that we do not know of any painted glass to which can be assigned with certainty an earlier date than that of the eleventh century.

The earliest specimens of painted glass known in Great Britain are the remains of a Jesse window in York Minster, and one of the same class in Canterbury Cathedral.†

As I purpose, with the permission of the members of the Institute, to read other papers connected with this most interesting subject, I will conclude at present by giving you the substance of a paper read by the most accomplished artist in painted glass of modern times, Mr. John H. Powell, the son-in-law of the illustrious and immortal A. Welby Pugin.

Mr. Powell has taken his subject under three heads, viz. — Colour, Design, and Drawing.

The first thing which strikes the eye on approaching a stained-glass window is its colour; and no one with a natural or cultivated taste for the beautiful can help feeling the translucent influence of a fair old window—how it softens the light without destroying it, preserving and assisting the architectural lines and features of the building without breaking the wall surface; and how, by its solemn light and religious stories, and by excluding external objects, it keeps the eye within the building, and directs the mind by its design. Without true harmony and balance of colour, the most careful and beautiful drawing is entirely ruined or lost; this, therefore, is the most important feature.

Now, one of the peculiar characteristics of the old glass is the simple, distinct tone of colouring, which, being constantly repeated with certain variations, runs like some old melody through all their windows. This is seldom or never attained in modern ones, where generally the colour is either too patchy, from being in too large masses, or too much cut up by an attempt to introduce every positive or neutral tint in existence, thus producing the effects of a kaleidoscope, in which the colours are thrown together by chance without reference to the harmonious effect of the whole. The excellence of the

* By Mr. Thomas Earley, Associate. Read at Royal Institute of the Architects of Ireland, March 18th, 1869.

† Opera Græce Latina.

‡ "The Art of Glass Painting," folio (1774), p. 10.

§ "Historical and Descriptive Essay on Glass Painting," Rouen, 1832, p. .

* Leveil, p. 11.

† Mazier: "Antiquities of Pompeii."

‡ Leveil, page 12.

* Translated by Hendrie, Murray, London, 1847.

† Winston.

old work in this respect is strikingly illustrated in the east window of Gloucester Cathedral, where only four colours are used with wonderful effect; and again at Mertou College, where only one coloured band runs through the series of side windows upon grisaille glass with flowered bordering, tying them together and becoming an architectural feature in itself. In these and a hundred others, the eye rests naturally upon the intention of the window as a whole, instead of being dragged from one corner to another, astonished and bewildered at the violence and variety of colour, and which looks as if a committee had chosen the best and worst parts of a dozen competition drawings, and had them all arranged in one window—perhaps a not unlikely way of accounting for many failures, for no number of clever men can design a window half as well as only one following out his single idea. Another great charm of the old glass lies in the quantity of pure greyish blue, which generally circulates to the most remote corners, toning down and giving weight to more vivid colours; and backgrounds are usually of this blue, for no other colour relieves the figures so well, or admits of such a variety of tints harmonizing upon it. Thus I might mention each colour, shewing how knowingly it was used, and its peculiar beauty of tint,—the rubies thick, streaky, and brilliant, with the colours generally mixed throughout the substance of the glass, not only flaring on the surface, as is usually the case in our modern glass; the greens always quiet, and used in large masses, not strong and vulgar; the whites always pearly or silvery, not thin and clear, and dispersed over the whole to give proper value to every tone; the brown purples used as a soft transition between the ruby and the blue, and over all the golden yellow as a tint of sunshine, not the vulgar orange of the hall windows in our modern villas; and as the seven notes in music are capable of infinite variety by juxta-position, so those few colours, varied from the palest to the richest shade, were sufficient for endless variety in the hands of the old painters, the peculiar tint of each helping very much the effect of the whole.

In the deep knowledge of choosing these arrangements of colour the old men excelled, whether by science or by mere cultivation of the eye; and so carefully did they select the tints, that the broken fragments—the mere ruins of an ancient window, thrown carelessly together by some thoughtless glazier (as at Lincoln—the rose window), is much more harmonious in its decay than most modern pretentious display. It is often said, 'Oh, time has done most of it; dirt and atmosphere will harmonize anything.' Nothing is more false. It may be true that the more a modern failure is covered and hidden, the less its poverty and bad colouring will be perceptible; but regarding an old work, the brilliancy and jewel-like effect of the glass when new must have been startling. The secret of their success lies in the material and its arrangements. The fine thick, uneven pot-metal caught the rays of light, and held them struggling and flashing in its gem-like substance until the whole became a translucent picture, but without hurting the eye of the spectator, as no ray of light could pass directly through it. The four windows in Ely transepts, by the Gerentes of Paris, give very much of this effect; though placed injudiciously high for their small grouping still give a fair idea of what old glass was, fresh from the hands of the artist.

ON FURNITURE WOODS.

FURNITURE, as connected with the art of Decoration, requires, both in its manufacture and selection, and in its subsequent disposition, a knowledge of architectural styles, of the laws of construction and of colour, so that not only appropriate character, correct principles, and agreeable forms may be adopted, but such combinations be made, as will contribute to a suitable and harmonious whole. To these qualifications should be added a practical knowledge of the character, properties and appearances of the different woods employed in furniture-making.

The wood of which any article of furniture is to be made being the raw material on which skill and labour are afterwards to confer beauty and value, it is obviously necessary that the exercise of experience and judgment should, in the interests both of the manufacturer and the purchaser, begin at this point. For, suppose a manufacturer at a wood sale to purchase at a large price a log, say, of mahogany, which should turn out unsound, or not particularly distinguished for "figure" as expected, he cannot have a reasonable profit on his outlay, except at the expense of the purchaser. Again, supposing the log so purchased to be all that could be desired, one man may be able to get it cut up to much greater advantage than another, and thus he would be able to give his customer as good, or better, value at less money, with equal profit to himself. Of course that manufacturer is most likely to have a good character and a good business, who does most to make a first purchaser become a second.

There are some forty or fifty different kinds of wood occasionally employed in furniture-making. Of these a few are wholly used in the manufacture of coarse and inferior articles, or in the framework or foundation of superior articles that are exteriorly finished with some of the more valuable and ornamental kinds. To discuss the properties and characteristics of all, or even many, of these, would be to expand this paper to an unnecessary and inconvenient length; but a few of the most important and extensively used may be selected, such as pine of the different kinds, cedar, oak, rosewood, walnut, and mahogany.

Pine.—There are three kinds of pine commonly met with in the commerce of this country, namely—red, white, and yellow. Red pine, although very valuable for house carpentry and out-of-door uses, is so seldom employed by cabinet-makers, that nothing further may be said of it here. White pine being more strong and durable than yellow, is well adapted for many purposes of the cabinet-maker, such as deal backs, bed bottoms, kitchen furniture, &c., but it is not suitable for veneering grounds, from its unevenness of grain. The variety of white pine known as Norway spruce is superior to the American varieties, and is in fact the best variety we have.

Yellow pine is now chiefly imported from St. John's, New Brunswick, or, at least, the best comes from that port. Since it became an article of commerce in this country some fifty or sixty years ago, it has completely superseded white pine as veneering grounds, for which it is admirably suited from its uniformity of grain, freedom from resin, and the facility with which it can be wrought. There is, however, great diversity in the quality and condition of different logs, and even in different parts of the same log. Of late years bedroom furniture of very fine yellow pine has been much fancied, but the cabinet-maker will

find suitable purposes for coarse and fine, provided it be sound and free from shakes.

Cedar.—There are several varieties of this wood, which is a species of pine, but the most generally useful is the red variety commonly called pencil cedar. It is light, straight-grained, durable, and easily wrought, but liable to split. Its odour renders it inimical to insects, and on this account it is most generally used in the internal parts of cabinets, wardrobes, drawers, &c. The name of cedar is given to some other woods, which, however, are of quite different kinds, and are but little, if at all, used in furniture-making, if we except Havannah cedar, which although strongly resembling red cedar in many of its properties and uses, is nevertheless a species of mahogany. The "Cedars of Lebanon" are remarkable for their great size and beauty when growing, but do not possess many useful properties for practical purposes.

Oak.—There are two principal varieties of this wood, commonly known as British or native, and wainscot oak, the former however meeting but little or no application in the manufacture of furniture. Of those kinds of wainscot oak that are most generally employed for furniture or internal finishing, that known as Riga is the most valuable and useful to the cabinet-maker. There is another variety, called Quebec, much used in the trade, because it is much cheaper; but being inferior to the Riga in fineness of grain and beauty of "figure," it is chiefly employed for articles of inferior use, as hall or kitchen furniture, cheap instrument-cases, plate-chests, &c.

Many, if not indeed all, of the inherent beauties of oak timber depend, for their development in the finished article, on the manner in which the log has been handled on the saw-pit. The silver grain, or "feather," will lie hid or be brought out, according to the direction given to the saw-draughts; and it is worthy of notice that the best direction for these draughts, is also the most economical. But the most important point to be attended to in the manufacture of oak furniture is the seasoning of the timber. When oak is worked up before it is thoroughly seasoned and dry, it splits in every direction. The concealment of these splits or cracks is often attempted by the insertion of slips, which for a while may escape an unpractised eye, but are certain in time to show themselves and aggravate the defect. Several artificial processes have been devised for the purpose of quickly seasoning oak timber, but none have yet been discovered so good as the natural method.

Oak becomes more or less black by long immersion in the sea, or in bog. Furniture of oak in this state is sometimes fancied by persons who either have it on their own properties, or can readily procure it otherwise. But the extra cost of workmanship, and the peculiar liability of such timber to certain defects, more than counterbalance any fancied beauty attaching to the colour.

Rosewood.—This is a fine furniture wood, of which there are several varieties, as might be expected from the fact, that it is brought from different and distant quarters of the globe; but the largest and finest comes from Brazil, particularly Rio Janeiro. Size, soundness, colour, and figure are the chief properties to be sought for in rosewood, and there is perhaps no kind of wood more depending for its value and beauty on proper directions to the sawyer, whose draughts should be directed on a different principle from that observed in oak or mahogany. Rosewood is

very difficult and slow to season properly, and being of an unctuous nature, takes glue but very indifferently; its elongated and numerous pores, too, sometimes demand unusual care and skill at the hands of the polisher.

Walnut.—This is a fine furniture wood, cultivated in almost every part of the European continent, particularly France. It was one of the first kinds of fancy wood which supplanted oak for ornamental furniture, for which it is better adapted, particularly where the internal finishings are of oak, as it is closer in the grain, softer, and more easily wrought, much more faultily marked, and susceptible of a higher polish. Its characteristic colour being somewhat neutral, it is particularly well suited for the insertion or surroundings of variously coloured ornaments. It is not, however, likely ever to enjoy a steady patronage for ornamental furniture, from its want of lustre, which mahogany, for example, has, in addition to all its other best properties.

Mahogany.—This may, in general terms, be regarded as the king of furniture woods, for its unrivalled beauty, not less than its durability, and its applicability to almost every purpose. There are three principal varieties of it imported into these kingdoms, namely—from Honduras Bay, and from the Islands of Cuba and St. Domingo. Formerly mahogany scarcely inferior to that from St. Domingo was imported from Jamaica, but little or none is now imported from that island.

The first of the above-mentioned varieties, frequently called by tradesmen, baywood, is now chiefly used as veneering grounds, or for solid work, but was formerly used more extensively for finishing purposes. The change has not been without some reason, as experience has shown that the importations for many years past are of inferior quality; that even the best of it soon loses colour, while, at the same time, its superior fitness for many purposes where this change would be of no consequence, as foundry patterns, &c., has so increased the demand for it in other trades, as to make its continued use less profitable to the cabinet-maker than other woods, equally suitable and cheap.

In point of texture and firmness, Cuba mahogany is much superior to Honduras, and but little inferior to St. Domingo, but in other respects it is much inferior to the latter, as it does not improve in the working, nor acquire that rich mellow appearance which time gives the St. Domingo wood. Besides, it is apt to be spotty and streaky.

There are, however, many purposes in cabinet-making in which these defects are of no consequence, and for which various other properties possessed by Cuba mahogany, render it by far the most suitable.

St. Domingo mahogany is the most valuable variety of this very beautiful wood, and it is on record that logs of it, the produce of a single tree, have fetched the high price of £3,000. That which grows in the vicinity of the port is by far the best, but on this account, timber of a very inferior quality is often brought from distant forests, and exported under the name of St. Domingo mahogany. That which forms the chief grounds of value in this variety is its "figure," which has different names according to its character, as "mottle," "curl," &c. But as this "figure" depends in many respects on circumstances which may affect its qualities in other ways, it is evident that a practical knowledge of the wood is necessary to a safe selection of specimens. T.

(To be continued.)

MECHANICAL ARTS.

(Continued from page 64.)

STEEL.

Iron is used in the arts in three states, namely—as cast iron, wrought-iron, and steel. Steel is a compound of iron, carbon, and some other substances contained in the ore, and as these substances can be combined with the iron in various proportions according to the nature of the ore, and of the processes which it undergoes in manufacture, it will be easily understood that steel can be produced in an endless variety of quality. There are four kinds of steel in general use, namely—blistered, shear, cast, and bessemer steel. Blistered and shear steel belong to the same class, and can be easily welded to wrought-iron. This class of steel is principally used for such purposes as facing hammers and edge tools. Cast steel cannot be easily welded to iron, and is chiefly used for such articles as are made entirely of steel, as files, cold chisels, and drills.

Blistered steel is made from the purest wrought-iron by keeping it at a great heat in contact with charcoal in a cementing furnace for six or eight days. It is principally Russian and Swedish iron that is used for this purpose, the bars being from 8 to 14 feet long. The furnace in which the process of cementation is effected consists of two troughs each about 15 feet long, and made of the best fire-stone 4 or 5 inches thick. The troughs are from 2 to 3 feet deep, are the same breadth as depth, and are at least 12 inches apart. Under and midway between these two boxes or troughs, and extending nearly their whole length is a furnace open at each end where it is supplied with fuel. The fire is kept up as uniformly as possible during the operation, and the flame is directed equally round the troughs by numerous air holes and flues. In order to confine the heat as much as possible, a dome or arch of brick is built over the troughs, so that when the furnace is at work there is an intense heat kept up within this oven.

The cement used in the process of conversion consists of ground charcoal, hardwood charcoal being preferred, mixed with about one-tenth part of wood ashes, and one-twentieth part of common salt. Soot is sometimes used instead of charcoal. The bottom of the trough is covered over with this mixture to about the depth of 2 inches, the bars are then laid in upon their edges, the side bar being kept 1 inch distant from the side of the trough, the other bars are kept about three-fourths of an inch apart, the spaces between them being filled with the charcoal powder. Another layer of powder is then sifted over the bars an inch deep, and another row of bars is laid on, their edges being placed opposite the interstices of the first layer of bars. In this way the troughs are filled to about within 6 inches of the top, when the remainder of the space is filled with cement powder which has been used. The troughs are then covered with damp refractory sand in order to exclude the air, which, if admitted during the process, would injure the cementation. The entrances to the furnace being carefully closed, the fire is lighted and gently urged for a day or two until the proper cementing heat is attained. This heat is then maintained for five or six days, or whatever less time may be necessary to allow the iron to absorb the quantity of carbon requisite to form the kind of steel required. When this is accomplished the fire is withdrawn and the oven allowed to cool gradually down; the bars are then removed, having thus been converted into "blistered steel," so called from its surface being covered with numerous blisters.

Shear steel is made by breaking the bars of blistered steel into lengths of about 18 inches. Four or five of these lengths are

then heated to a welding heat and drawn out into a single bar under a tilt hammer moving rapidly. The value of the steel increases with the amount of tilting it receives.

Cast steel is produced by the process of casting, that is, the bars of blistered steel are broken up into fragments, and melted in crucibles. The liquid steel is then poured into ingot moulds. As some carbon is always dissipated in the process of melting, a somewhat highly-converted steel is used for this purpose. The cast bars from the moulds are subjected at a low heat to successive hammering and rolling, and reduced into the condition of finished bars.

Bessemer steel is produced directly from pig-iron. The process was originally intended to extract a sufficient quantity of carbon from the cast iron so as to convert it directly into steel, but having no method of ascertaining the exact quantity of carbon extracted, there was no uniformity in the quality of the steel produced. The plan then adopted was to extract the whole of the carbon out of a certain quantity of cast iron, and then introduce into it a measured quantity of cast iron containing carbon, thus the requisite proportion of carbon required to constitute steel is obtained.

The process is as follows: Molten iron which has been fused from No. 1 pig-iron, is run into an iron vessel lined with refractory sand. The vessel is mounted on two bearings, one of which is hollow and forms part of a pipe which communicates with the tuyeres in the bottom of the vessel, so that the converting vessel can be turned in various positions without affecting the blast driven through the tuyeres. When the molten metal is first run in, the vessel is kept on its side so as to prevent the metal from running into the tuyeres. The blast is then turned on, and the vessel turned into an upright position. The force of the blast rushing through the metal agitates it, and the carbon is burnt off with an intense heat; when all the carbon has been extracted the vessel is again turned on its side, the blast turned off, and the measured quantity of charcoal pig-iron introduced into the vessel. The blast is then turned on again and the temperature quickly raised, when the process is complete. The steel is then poured into ingot moulds.

EARTHQUAKE-PROOF ARCHITECTURE.

THE latest thing out in the building line is "Earthquake-proof Architecture." The recent earthquakes on the Pacific coast have necessitated the adoption of some new style of building in that section of the country. Mere brick shells will not stand many heavy land shocks, and the architects of San Francisco are now busy over earthquake-proof plans of architecture. The last severe earthquake in that city cracked a large number of brick walls, which have had to be braced together with iron rods to make them in any way safe. A very little heavier shock would have tumbled them into ruins. The fact that these sensations may come at any time has somewhat shaken the faith of the people in the security of their brick houses. One of the new plans proposed is to build a compact wooden frame structure, and surround it with brick walls. The frame would secure it against falling, and the walls would render it fireproof. A large publishing-house in San Francisco is soon to erect a store upon this plan. Another method proposed is to build thick walls with iron girders inserted in them, and riveted at the angles. There has been considerable discussion among builders on this matter, and a new field is open for the ingenuity of architects. Anybody who will guarantee to put up a house that will stand an ordinary earthquake without damage, whether it be built of wood, stone, iron, paper, or rubber, can make his fortune on the Pacific coast. As soon as such buildings can be devised, earthquake-insurance companies will doubtless be established there to satisfy individuals who have not complete faith in the stability of real estate on the Pacific coast.

THE COMPOSITION OF CEMENTS.*

THE value of all cements must of necessity depend upon their composition. There are two distinct kinds of cement, with three distinct names—the calcareous, the hydraulic, and the plastic. The calcareous is everywhere known by the name of mortar, or that mixture of lime and sand commonly used for building. The hydraulic cements are those which will set under water, and the plastic cements are such as are applicable to plastering and stuccoing. Of lime there are many varieties, each of different merits. Vicat classified them as—1, rich limes; 2, poor limes; 3, limes slightly hydraulic; 4, hydraulic limes; 5, highly hydraulic limes. As there are different qualities of limes, so, of course, there must be of limestones. It has long been held, and universally proved, that the harder the ingredient the better the quality of the lime; that the best materials are those that dissolve the quickest, heat the most in slacking, and fall into the finest powder. It should be remembered, however, that each variety yields a lime of different quality—different in colour, in its power of absorbing water, and varying in weight and in hardness. The rich limes are the purest oxides of calcium; they increase to double their bulk in the process of slacking, which is not the case with poor limes. Limestones containing from 1 to 6 per cent. of foreign substances, such as silica, alumina, magnesia, iron, &c., yield rich limes. The limestones may differ in appearance and in texture, yet if well calcined the lime will be the same. Soft chalk, hard ragstone, or marble yield equally good lime, since the calcium they contain is the same mineral. Chalk, however, generally contains water irregularly distributed, and not exhibiting the same change that marble or stone does, it is frequently unequally burned, and therefore slakes imperfectly. Dr. Higgins states that lime made from chalk absorbs the carbonic acid more rapidly than that made from stone, but the experience of others (the late Mr. Arthur Ashpitel notably) has not favoured this conclusion. The mode of burning varies, but the general result is the same. The resulting quicklime is lighter than the original stone, and differs essentially from it.

Poor limes are obtained from limestones which contain silica, magnesia, manganese, or metallic oxides. These foreign substances are present to the extent of from 15 to 30 per cent. They do not slake freely, and they are more liable to vitrify in burning. Oysters or cockle shells are found to vitrify more easily than limestone or chalk when suddenly heated, which is attributed to their saline matter, for when they have been long exposed to the weather they do not so easily vitrify. In proportion as limestone contains gypseous or argillaceous particles does it vitrify. Limestones containing much silica swell in setting, and may dislocate the masonry executed with them. If alumina be in excess the lime is apt to shrink and crack. If carbonate of magnesia be combined with carbonate of lime, as is the case in magnesian limestones, the original bulk is retained.

The mixture of hard, sharp particles—the harder and sharper the better—is necessary for various reasons. It facilitates the setting of the mortar, it renders it much harder and much more adhesive, and saves expense. Three kinds of sands are used in building purposes, but only two are employed for cements. River sand and pit sand only should be admitted into the composition of mortar, and the former is preferable, as it is free from clay. Pit sand should be well washed. Crushed quartz or flint, from its sharpness, has been considered to be the best material. Many builders use road-drifts, and have found it to be a fair substitute for sand, and withal economical. The Romans used burnt clay, in the form of pounded brick, very extensively; and the present method is to throw up clay mixed in any fuel in loose heaps and burn it slowly. Burnt clay was, indeed, largely used and advocated in France.

Used as hydraulic mortars in large public works it was found that the action of sea-water soon made them crumble to powder; and it was only in fresh water that the mortar stood well. Slag from furnaces and the scoriae from the ironworks have also been used for sand; the latter not so frequently, on account of the iron found in it. Coal cinders have been used, but not with much success, and wood cinders, which, however, are found to be too alkaline for the purpose. These materials have a considerable effect in hastening the absorption of the moisture and facilitating the setting of the limes with which they are used. Puzzuolano—so called because originally found in the vicinity of Puzzuoli, near Naples—is a volcanic material. The following analyses of this material were given by Professor Ansted in his Cantor Lectures at the Society of Arts in 1865. We observe that they vary a trifle from the analyses given by the French writers:—

	Puzzuolano.	Trass.
Silica ..	41.5	37.0
Alumina ..	15.0	12.0
Lime ..	8.0	2.6
Magnesia ..	4.7	1.0
Iron oxide ..	12.0	5.0
Potash ..	1.4	7.0
Soda ..	4.0	1.0
Water ..	9.2	9.6

The French writers consider that the mixture of common lime with these materials should be 1 of pounded lime to 2½ of puzzuolano, or to 2 of trass (or terrass), or 1 of lime to 1 of sand and 1 of puzzuolano. The matter, however, is largely one of economical calculation.

A good test of the purity of sand, and a most important one, is the homely practice of rubbing it between the hands. If it be fit for use as mortar it will not soil the hands, and will be free from odour. Dr. Higgins, whose experiments on sands have made him an authority on the subject, has pointed out that mortar made with sand whose grains were about equal in size and globular, could not be so strong at any period of induration as that which is “mixed with as much fine sand as can easily be received into its interstices, in order that the lime may cement the grains by the greater number and extent of their contiguous surfaces.” He also states that the sand that passes through a sieve in *washing* is finer than that which may be sifted through the same sieve when dry. Sand is never non-absorbent and imperishable, and, therefore, it is useful it should be pure when used for building purposes. The Mediæval builders knew this, and hence the fine character of their masonry.

The results of experiments made by Dr. Higgins, and detailed at some length in his work—now, we believe, out of print—are of considerable importance. Very briefly summarised, they may be thus stated:—The interstitial spaces in sand are greatly lessened by wetting it; therefore he determined in using it for mortar to wet the sand completely. It was thus, too, that the air, was easily expelled, and the lime equally diffused itself in the spaces by a little heating; but when, as he says, the water is added to a mixture of lime, powder, and sand, the air is entangled in the lime paste, and cannot without a great deal of heating be totally pressed out of the plastic mass. As an excess of water is injurious to mortar, this was found to be an excellent way to regulate the quantity used, “for the portion of lime water which fills the spaces in sand, and can be held by capillary attraction in a flat heap of it, is precisely the quantity which makes well-tempered mortar with one part of the best slaked lime and seven of the best sand.” Other investigations showed that there were two kinds of grains, which Dr. Higgins denominated “sharp” sand and “round” sand. The conclusion of all his experiments goes to show that the quantity of lime which forms a mass somewhat plastic with sand and water is the smallest quantity necessary for making the best mortar from such sand. Any further quantity of lime would be useless in the coarser sands and injurious in the finer. The necessary plasticity is induced by the smaller quantities of lime. The grains of fine sand are, he says, held asunder by the lime paste to a greater

distance than they are by water, and “the reason why the finer sand requires more lime than the coarser and mixed sand is that the spaces, which are more numerous in fine sand than in the coarse, are more augmented in the whole quantity of them by the particles of lime which intercede alike the coarse and fine grains.”

We have already said that river sand, or “silt,” is the best of all the kinds of sands used for building purposes. Pit sand is too fine, and not so sharp and gritty. Coarse and fine sands, then, should be mixed in order to obtain a good cement, since the finer grains fill the interstices of the larger, and so tend to consolidate the whole mass. The two ingredients should not be mixed before slaking, but the bulk of the water should be applied to the sand before it is mixed with the lime, Dr. Higgins’s experiments teaching us that in this way the air is more easily expelled from the mass, and the mortar, therefore, is of a more durable nature. This being so, the common practice of “duffing builders” in running up new houses to use sands without first washing them, indeed to use any kind of rubbish—sand mixed with organic matter—is discreditable. Surely, when the materials “found on the spot” are used, it is only common honesty to regard their quality, and to remove from them the deleterious matter with which they are charged.

It is important that all water used in making cements should, at least, be fresh. In any case, it should not be polluted, stagnant water. All vegetable and organic matter should be as much excluded from the water as from the sand into which it is thrown. Ordinary water contains some acidulous gas, and therefore it has been recommended that no water should be used until the gas had been freed from it. After making several experiments, it was found by Dr. Higgins that lime water is far preferable to any other. On comparing specimens of mortar made with the best lime slaked with river water, and sand and water, and spread on tiles soaked in water, with other specimens made with the same proportions of lime, but *slaked with lime-water*, and sand and lime-water, and spread on tiles previously soaked in lime-water, the latter at every stage of them were sensibly harder, and they adhered to the tiles better than the former. He adds that he had good reason to be persuaded that the extraordinary induration would proceed in time through the whole mass. Of course, it is not difficult to adopt this plan, since lime-water is readily made by dissolving lime in large casks or tanks.

We have thus considered the main principles which affect the three ingredients of mortar—the lime, which is the cementitious medium, the sand, which is the matter to be combined, and the water, which is the combining element or agent. We have now to look—space compelling us to do it with the utmost brevity—at what preachers would call a few matters of application. The mortar must be durable; free, by its very compactness, from damps and atmospheric influences, and thus those much-dreaded enemies, expansion and contraction, avoided.

These results are alone attainable by attending to the judicious combination of the various ingredients. Given pure materials, the best combination is proved to be one part of lime to five, six, or seven parts of sand, the latter varying, of course, with its nature. Pit sand requires more lime than sharp river sand or clear road drift. Coarse sand requires less lime than fine sand. Mortars made with common fresh lime, or with well-burnt lime, but containing only one ounce (say) of lime in six or more of sand, have been found by some experimenters to be the best. An excess of lime may dispose the mortar to crack. According to Dr. Higgins, the highest proportion of lime to coarse Thames sand which may be used with safety depends on the circumstances in which the mortar is to be exposed. “No more than one part of lime to seven of coarse sand ought to be used in mortar which is to dry quickly, and less lime may not be used because it does

* From the *Building News*.

not render the mass sufficiently plastic for building and incrustation." At the same time, if a larger proportion of lime be used, it should be only when the mortar cannot dry so quickly as when exposed to the sun. But hasty drying, it has been proved, frequently injures mortar. Then, again, if the lime be carelessly or imperfectly manufactured, the mortar cannot be other than imperfect. The lime should be screened about half an hour after the workmen have thrown the water upon it. When they slake lime mixed with sand or gravel in great heaps, without screening it—which is more frequently done than not—the mortar is not likely to be very good.

Lime very quickly imbibes the acidulous gas which has been expelled after burning if it be exposed to the air. Indeed, it cannot long preserve its virtues without confinement in air-tight vessels. Experiments have demonstrated that lime undergoes changes quickly; indeed, well-burned chalk lime kept in a dry room will imbibe about a pound of acidulous gas in three weeks in the summer months, so that the longer it is kept the worse it becomes. Workmen are apt to think it is sufficient to keep the lime dry, and store it in rickety barrels. This is not the case. Lime may be greatly impoverished without slaking sensibly. "The superficial parts of any parcel of lime, which fall into fragments or powder without being wetted, and merely by exposure to air, are quite unfit for mortar, since this does not happen until they have imbibed a great deal of acidulous gas." To prevent common cements being bad or imperfect, the lime should not be exposed a great while before it is converted into mortar. If this be not done, the lime will be reduced into a perishable kind of whiting; indeed, bad lime, bad mortar. Imperfectly burned and unprotected lime will only give a builder a poor article, and we are writing of course for those who do esteem a good common cement; and the quicker it is used, and the less exposed to the deteriorating influences of the atmosphere, the better material will it be.

THE ROYAL IRISH ACADEMY.

A GENERAL stated meeting of the Academy was held on the 16th ult., to receive the annual report of Council, to elect officers for ensuing year, and for other purposes,

Lord TALBOT DE MALAHIDE (President) in the Chair.

After the annual report had been read and adopted,

Dr. Beatty said that as this was the usual night for the general discussion of business, and believing that for a number of years Sir Wm. Wilde had had the nominal charge of the museum, he wished to ask him how it came to pass that the lower portion of the museum had been, without notice to the Academy, turned into a library and reading-room, and that the antiquities formerly therein had been locked up both from the members of the Academy and the public for nearly two years; and, also, what steps had been taken for the exhibition of the "Petrie Collection"?

Sir William Wilde, in reply, said:—I regret to state that for a few years past the archaeological section of the Academy, and the museum in particular, has been somewhat of a stumbling-block to another section of the Academy, and that a falling off has taken place from the ranks of our most eminent scientific members. It has been said here and elsewhere that of late years the archaeologists and antiquarians have so preponderated, and our museum has become so prominent and expensive a feature in the Academy, that scientific members have left us and established another society—"The Dublin Scientific Club"—which, in its department, must be more or less a rival to us. And it has been asserted that the Academy is falling away from its original legitimate objects, and has become a mere antiquarian society. If it should, no one would regret it more than I would. But the fact remains as I have stated, that the ranks of our working scientific men have been thinned, and our ordinary meetings are not as highly

honoured by men of science as they used to be. It has been asserted that this defection was first produced by the addition in the wording of the usual annual resolution placing £50 at the disposal of the council from "for the purchase of antiquities," to "and museum arrangements," and thus allowing us to expend a few pounds (when antiquities were not offered for sale) upon a work equally valuable, and, indeed, indispensably necessary—that of registering the circumstances under which they were found or procured. The annual boon of the Treasury Trove Fund of £100, for the purchase of antiquities, has largely assisted us in relieving the Academy Museum grant; and, therefore, on an average of the last few years, we have only spent about one-half of that £50, and returned the balance to the general funds of the Academy. I do not think that any feeling against archaeology had any effect upon our scientific members, for I remember with gratitude, and take this public opportunity of expressing it, that when in 1856 I proposed, at the suggestion of some of the most distinguished members of the Academy, to officially undertake the arrangement of that incongruous mass of antiquities that were then huddled into the next room, the chief supporters of that movement were the men of science; and by their encouragement and aid I was highly assisted in that labour. We are also indebted for the gem of our collection, and the nucleus of our ecclesiastical museum, to the most scientific secretary we ever had, and one of the brightest ornaments of Trinity College—the late James McCullagh. To go back to the question raised by the member as regards our collection, I shall endeavour to marshal my facts as succinctly and as briefly as I can. Nearly twenty years ago the State had provided us with a Museum Building as suitable as the nature of the premises would permit; but it was unprovided with cases for the safe keeping and display of the collection. An endeavour was made to heat it, and render it thief and fire proof, and to a certain extent, and perhaps as far as it was possible, that was effected. With respect to the arranging and cataloguing of the museum, I will not occupy the time of the meeting, for I have already received both at home and abroad my full meed of praise for that undertaking. But I may mention this fact—that for several years a large portion of the manuscript of the continuation of that catalogue has been prepared; that about £30 worth of the woodcut illustrations for it were paid for many years ago; and, as stated in the report to council, there is now £43 in bank arising from the sales for the continuation of that work. This cannot, however, be made use of until our museum arrangements are further advanced. I am most reluctantly driven to the conclusion that in all these matters, from the unauthorized occupation as a reading-room of the lower compartment of the old museum to the present hour, there has been on trial a "battle of the books," a case of library *versus* museum, and I am free to acknowledge that the books have beaten the antiquities out of the field. With regard to the Government Commission that has reported upon this institution, one half of its members were also members of the Royal Irish Academy, and so far, I take it, that they were favourable to this institution. In this report they have made suggestions—offered some advice; and in the fifteenth section of their recommendations stated "that the premises of the Royal Irish Academy being insecure, insufficient, and unsuitable for its purposes, it is desirable that the Academy should be transferred to a building in a central site already indicated, adapted for its valuable collections; and that rooms should be provided for its meetings, administration, and library" (see p. 37.) With that recommendation every one must agree. But the commissioners go somewhat further in their sixteenth recommendation, and state "that the Academy should be invited to make arrangements for the exhibitions of its collection in connection

with the department of the Science and Art Museum devoted to antiquities." From the context, and some foregoing passages in the report, it would appear that the commissioners suggest that the ground south of the Dublin Society's premises, from Kildare-street to Upper Merrion-street, should be purchased, and thereon erected a group of public buildings, including a Museum of Science and Art of the Royal Irish Academy. Having thus described the symptoms and investigated the causes of the malady, which is not a fatal one, I should be failing in my craft if I had not some remedy to offer. Let it be recommended to council to avail itself of whatever funds are still in the hands of the Commissioners of Public Works out of the museum in the long room, or to apply immediately to the Government for such funds as shall enable them to do so; and I place my services entirely at their disposal, and am willing to act harmoniously with the officers of the Board of Works, and let bygones be bygones, provided neither I, nor the architect, nor the museum clerk are unnecessarily interfered with by any other department of the Academy. In conclusion, let me add that, whether we stay here or go elsewhere, the standing cases, whether of wood or metal, now so much required for the museum, can be available anywhere, and, being the property of the Government, can be moved at will. Thanking you for the patient hearing which you have given me, let me say this here, as I stated to the commission:—If the Academy gives up its museum, it will, in my opinion, act injuriously on this institution, by which that museum was created. But whether it does so or not, let the Government or the Academy open the collection without further delay freely and fully to the public of all classes, and at all times.

It was proposed—

"That in accordance with the Treasury Orders of June, 1867, and December, 1868, it be recommended to council to take immediate steps for the continuation of the museum in the tea-room on the drawingroom floor, which was commenced in August, 1867, and, pending the Government action on the report of the commissioners on scientific institutions, to suspend all works in the council room for the present; also to take means for exhibiting without delay the 'Petrie Collection.'"

After some discussion, as the President was about to leave the chair, the resolution was withdrawn, and the meeting adjourned.

LEDGER'S RAILWAY SIGNAL.

WE (*Colliery Guardian*) have just seen in operation, on a working model, an ingenious invention by Mr. Henry Ledger, builder, Hulme, for railway signalling, which, from its entire novelty and inexpensive character, will doubtless receive the attention its merits deserve from the managers of railway companies. Without the aid of diagrams it is impossible to convey a clearer idea of the nature of this invention than by using a part of the inventor's specification to the following effect:—"The object of this invention is the application of simple, inexpensive, and reliable apparatus, which cannot be tampered with, to railway carriages, in order that passengers may communicate or signal to the guard or driver of a train, and at the same time receive instantaneous personal assistance in case of necessity, whilst the train is in motion, from their fellow-passengers in any other compartment of the same carriage; and the application of this invention is also to afford a means of escape from any compartment in case of fire or accident whilst the train is in motion." The invention consists in providing a thoroughfare of ample dimensions through the whole length of the carriages, and from one carriage to another, if necessary, by forming a doorway and fitting a door in each division or partition which now separates carriages into compartments, and, if necessary, in the ends of the carriages. These thoroughfares and doors are situated above the seats, and the doors are made to slide up and down in grooves behind the seats, so that when closed such doors give all the privacy

to each compartment which at present exists. When closed, such doors are fastened by means of a self-acting hook, which is acted upon by a lever or series of levers connected to a rod running along the whole length of the roof of the carriage. In each compartment a chain is suspended, which is connected to an arm branching from the longitudinal rod before mentioned, so that when such chain is pulled by a passenger, the longitudinal rod turns partially, and thus the hooks are caused to release all the doors in such carriage, so as to open up a communication through the sliding doorways between all the compartments. At the same time the doors, in falling, come in contact with two levers connected by chains, passing over guide pulleys to semaphore signals mounted at each side, or on each side of the roof of such carriages, so that such semaphores are thrown out to signal in which carriage the guard is wanted; whilst, at the same instant, the chains connected with the actuating lever of such semaphores are caused, by means of a peculiar clutch attached to them, to pull the ordinary cord or rope which passed from one end of the train to the other, and thus actuate the hammer of a gong situated either in the guard's van, or on the engine, or both; or, if connected with the steam whistle, to cause it to sound an alarm. An indication is also given from which compartment the chain has been pulled, by means of a self-acting latch, which, when once released, renders it impossible to replace it in its original position without the use of a key made expressly to suit it. The whole mechanism of this apparatus is closed in so as to render it impossible to be tampered with.

THE ROYAL INSTITUTE OF THE ARCHITECTS OF IRELAND.

THERE was an ordinary general meeting on Thursday evening, 18th ult.

CHARLES GEOGHEGAN, Esq., Fellow, in the chair.

Other Fellows present:—W. J. Welland, A.B., and J. H. Owen, M.A., hon. sec. Associates: T. Earley, C. H. Brien, F.R.G.S.I., assist. sec.; W. M. Mitchell, W. Doolin. Students: J. L. Robinson, F. Nolan, D. J. Freeman. Non-professional Associate: J. Hodges. Visitors: Very Rev. Canon Pope, J. Martin, Esq., J. Rigby, Esq., G. H. Kidd, Esq., M.D.

The following recommendation papers were read:—As Hon. Fellow: A. Denny, Fellow, Waterford. As Associate: H. W. Thompson, Hazlebrook, Whiteabbey, Belfast.

Mr. Thomas Earley read a paper* on "Stained Glass," for which he received a vote of thanks on the motion of Mr. J. H. Owen, Fellow, hon. sec.; and he was requested to be so good as to explain the practical details of the subject at a future meeting; his present paper to be published in the Transactions of the Institute.

Geoghegan's Patent Regulator for water under high pressure, and that by Dr. Kidd with a similar object were explained by the inventors; Mr. Geoghegan's invention being exhibited at work in the rooms.

SITES FOR MIDDLE CLASS HOUSES.

ON the north side of our city a part of the Mountjoy Estate, to the extent of about ten acres, has been laid out, and streets formed, on which it is proposed to erect one and two storey houses. The situation does not need a word to be said for it; it is at the highest part of the city, and adjoins the main thoroughfare to the Phoenix Park, while it is but a few minutes' walk from Sackville-street. The lithographed plan has been submitted to us, and we consider it is very well arranged, and worthy of inspection by those contemplating investment of their capital in houses of the class above mentioned, and for which there is an unceasing demand. We had almost forgotten to state that already some fifty or sixty are built or in progress. Further particulars will be found in our advertising columns.

* To be found on page 75.

KILMORE CHURCH, DIOCESE OF DOWN.

THE churches representative of what we have been recently told to regard as "the three races" of Ireland (a mischievous and unpatriotic distinction, by the way) appear to be exhibiting a laudable spirit and generous rivalry in the rural parish in which the new church, the subject of our illustration, is being erected.

The Presbyterians have just completed a building of considerable importance for their worship, from the designs of the late Mr. Barre. Close adjoining it, the Roman Catholic residents have shown both their spirit and good taste in the church which, begun shortly after the one above referred to, now approaches completion, and which, so far exhibiting quiet elegance and good taste, does credit to an architect whose name we meet with for the first time, Mr. M. Thompson.

The Established Church inhabitants, following fast the example of their neighbours, are erecting in the same parish, on a site about a mile distant, the church the subject of our illustration, from the designs of Mr. Thomas Drew, F.R.I.A.I., of Dublin. It is a picturesque and prettily-situated building, of a character in harmony with its rural position. It is intended to accommodate 300 persons, and is carefully planned, with attention to convenience and suitability to the worship of the Established Church. It comprises a nave 57 ft. by 23 ft., a side aisle divided from the nave by an arcade of four arches 50 ft. by 12 ft. 3 in., an apsidal chancel 27 ft. by 23 ft., an organ-chamber, vestry, &c. The chancel, it will be observed, is the same width as the nave, and is divided from it by a handsome arch of cut stone, with sculptured responds. The tower is situated in the south-east angle and is used as an organ-chamber, opening into the south aisle and chancel with arches. The lean-to roof of the aisle is terminated eastward by the tower, and westward by a southern porch. The vestry and heating-chamber are on the north side.

The materials are local stone of a pleasing greenish tint for walling, Glasgow and Scrabo stone for dressings, and Castle Espie limestone (a Co. Down limestone, newly appearing in the market) in the shafts of the interior columns.

The cost, when completed, will be about £3,000.

Mr. James Murphy, of Belfast, is contractor for the work, which is being carried out under the inspection of the Ecclesiastical Commissioners' local inspector.

THE SHORT-SEA PASSAGE BETWEEN PORTPATRICK AND DONAGHADEE.

ENGINEERING difficulties are made worse by pecuniary difficulties. Engineering warfare cannot be carried on without "the sinews of war." A most advantageous scheme has sometimes to be left in abeyance from this cause. It is so with regard to the steam-packet service between Portpatrick and Donaghadee. It seems that the sailings are not to be repeated this summer, from the reason that the scheme is not so remunerative as was anticipated. This is a pity. After the great amount of agitation and discussion of the matter, and after, as we may say, the measure of actual success in the working that has attended this undertaking, it is to be regretted that this short sailing—under two hours—between Britain and Ireland should be abandoned. The number of passengers who, during the two months that the steamers plied last year, availed themselves of the passage was about eight thousand. Two voyages were frequently made to and fro in one day. That the passage is one which might and ought to prove most advantageous to either country, is fairly demonstrated. There is every reason to believe that, were the sailings to take place during the summer months of the present year, a far greater number of passengers, as well as larger freights of merchandise, might reasonably be looked for.

It seems, however, that the company have

determined to dispose of the two steam-packets that have been used for this route. Although this evidently means giving it up for the present, it by no means convinces us that, with greater energy and additional capital, this will not ultimately become one of the most advantageous routes between Britain and the North of Ireland. There is a railway both on this and on the other side of the Channel immediately from the steam-packet wharf, facilitating communication with every principal part of the country. There is no reason why this sea passage of twenty-one miles should continue to baffle the shareholders of an enterprise so creditable, and, as we firmly believe, destined to be so remunerative to its promoters.

At the same time, it can hardly be said that the special requirements of the case, either in point of harbour accommodation, or in respect to the class of vessel adapted to the line of passage have been properly met. In order fully to develop this line of communication with Britain, the communication should exist all the year. It ought not merely to serve for pleasure trips, but should be made, as it is evidently intended, one of the highways of communication between us and the sister country. With respect to harbour accommodation, it cannot be denied that it is very inadequate. The packet puts to sea abruptly, and at once. As soon as it leaves the harbour it is in the channel, which here being at about the narrowest, has consequently a great rapidity of current. The end of the voyage is the most critical time in a rough sea. So contracted is the mouth of the harbour at Donaghadee that it requires the utmost vigilance and skill to pilot the vessel safely into it. This harbour is one of the Government "harbours of refuge." The character of the work as to material and construction is excellent. As much, however, cannot be said of the accommodation afforded by it. Even as a "harbour of refuge," it is in a boisterous sea almost as difficult, if not as dangerous, to enter as to trust to the mercy of the waves. Still it must be admitted that although so dubious as a harbour of refuge, in general it has been almost without casualties during the time it has been used as a packet-station. With all the disadvantages of its plan, the importance of its maintenance is so great that every legitimate means should be employed to impress the matter on the Government. Mr. Johnston, one of the members for Belfast, intends to bring the subject before Parliament. There has already been some hint of the station being abandoned by the Government. If, after having expended much money there, and having constructed a harbour and lighthouse, which, although not altogether in the matter of plan with regard to "refuge" in strict accordance with the nautical peculiarities and requirements of the case, the Government are led to abandon it, there is no doubt but such a contingency would be calamitous. In course of time there is reason to hope that any engineering skill or desiderata that have been wanting in this maritime station will be applied to it. Meanwhile, the Government, having committed the construction, should, as a matter of justice both to itself and to us, maintain it in a proper condition until its use has become—as we have no doubt it will—so advantageous as to justify any re-arrangement that may be necessary for the better accommodation and the greater safety of ships.

During the short time that the passage between the harbours of Portpatrick and Donaghadee was traversed last summer, the company must be fully aware of the main requisites of the case. The vessel in its course is "broadside on" to the strength of the tides running up and down the Channel. Steam vessels were used that were not specially constructed for this line. Great strength and power of rudder mechanism is indispensable. In approaching the harbour the vessel is at right angles to the current. Now, so long as the mountain does not come to Mahomet, Mahomet must go to the mountain—that is to say, that if the harbour mouth is ill-planned with respect to the vessel steering



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into the harbour, the steering appliances of the vessel must as far as possible be adapted to the occasion.

While we use every argument that occurs, in order to assist, if possible, in the promotion of the national good, we cannot at the same time conceal from ourselves the discouragements that arise on these matters that *a priori* would be supposed to be scitifically abstract, and free from all political or party bias. Taking, for instance, the case on which we are commenting, men who assume to be acquainted with the matter tell us, that there are "natural disadvantages" which cannot be overcome in this case; and although Government has spent a good deal of money on the Donaghadee harbour and lighthouse, yet the engineers knew well enough that the works, when finished, would be of little or no advantage. We repudiate these notions. It is by no means an unhopeful sign for Ireland that the President of the Board of Trade scouts the idea that the ills of Ireland result from the fact that its inhabitants live in the neighbourhood of a "melancholy ocean." There is no reason on earth why the passage from Donaghadee to Portpatrick should be one whit more impracticable than that from Folkestone to Boulogne. And if the British Government have constructed harbour works at Donaghadee that do not fully meet the requirements of the situation, at least they should maintain those works until their disadvantages are remedied. To abandon them altogether would be great folly. We look for no such contingency. We hope—nay, we confidently expect, that this packet station will not meet with this fate. Native enterprise has done much, and is prepared to do more; and if Government energy is forthcoming to meet it, the matter is a certain success ultimately.

We shall have something to say in a future number about the entrance to Cork Harbour, and the Galway Packet Station. Apropos to this subject, it is matter of satisfaction that contracts are being taken for extending the pier at Holywood, and establishing steamboat communication between Belfast and that growing community.

THE FOULING OF SHIPS' BOTTOMS.*

As is well known, ships' bottoms, after a long stay in the sea, become coated with various organisms, animal and vegetable, which, in consequence of the increased friction they cause, retard the vessel's progress through the water; and the usual plan has been, on a ship's return from a voyage, to place her in a dry dock and then scrape away the creatures and plants which roughen her below the water-line.

Dr. Wallich proposes to kill these organisms by immersing the vessel for a time in fresh water; and there can be no doubt that fresh water will arrest their further growth and reproduction under such circumstances, even if in all cases it does not kill them outright, and so far, therefore, he is right. But Lieut.-Colonel Wortley is also right in stating that fresh water does not immediately kill such things, and that, though truly marine, they may remain alive in such fresh water for prolonged periods. These periods depend upon temperature and some other considerations too long to be entered upon here.

But, what is of far more consequence than the mere fact of some marine animals being fitted to exist for periods of varying duration in water which is wholly or partly fresh, I have to say that Lieutenant-Colonel Wortley is also correct in saying, that even if the soft parts of the animals, &c. be killed and removed by fresh water, their hard portions would remain attached to the ships, and would be as mischievous as ever unless removed by scraping, with as much, or nearly as much, labour as if no fresh water had been applied. The empty mussel-shells would remain for very long periods dangling singly or in bunches by their strong byssal threads; the empty barnacle shells would still adhere firmly and permanently soldered by their bases: and the basal attachments of

the seaweeds would be unremoved even if their fronds had sloughed away and disappeared.

If a ship on coming into port were unloaded and scraped, and if it was intended that she should remain for a considerable time before again going out to sea, then, after such scraping, Dr. Wallich's proposal to place her in fresh water during her home stay would, without doubt, be of much benefit, as, of course, the re-formation of the colonies of animals, &c., would be prevented during this period of time, and she would thereby be enabled to start on a fresh voyage, with a new cargo, with a perfectly instead of a partially clean bottom. But of course the whole idea presupposes that fresh-water docks are conveniently placed near at hand, that they are large enough to contain the number of ships on which the growth is to be prevented; and that, in short, the cost of applying Dr. Wallich's system does not exceed the value of the benefit to be derived from it. This is so evidently a question for practical men, who alone can judge of the ever-varying circumstances with which they have to deal, that I do not see how mere naturalists can satisfactorily dispose of the matter on paper. I see no objection to Lieut.-Col. Wortley's likening the cirrhi of the barnacle to a "glass hand," for the manner in which these organs are put forth, and are then unfolded, and are then made to grasp, in the act of closure, the minute floating organisms on which the creature feeds, does very much resemble the action of what may be conceived to be a set of colourless crystalline fingers. The simile is a happy one, though I fancy I have met with it before, as applied both to the barnacle and to an analogous action of organs having a similar function in a crab, *Porcellana platycheles*.

But the abstract fact of certain marine animals being able to live occasionally or entirely in fresh water, is an interesting one, apart from its direct commercial bearings. We all know that the salmon, which breeds in rivers, goes into the sea to feed, and that the smelt, which is regarded as a sea fish, not only visits rivers during certain periods of the year for spawning purposes, but that it has been kept for years continuously in a fresh-water pond without ever going to sea, and that under these circumstances it has thriven well, has abundantly multiplied, and has not deteriorated for table purposes. So, too, the sturgeon, which lives in the sea, and at great depths, is found commonly in rivers of the Continent of Europe; and more than that, it has been kept for years in freshwater ponds in the Zoological Gardens of London and Hamburg. In the latter place it has grown amazingly as well, and with it there is now, in the same pond, a large sea lamprey (*Petromyzon marinus*). This lamprey has been in the pond since 1865, and yet (on the authority of Mr. L. Lloyd, the excellent Scandinavian naturalist) its near relative, the hag (*Myxine glutinosa*), is killed directly by fresh water. Plaice, flounders and soles, all three of them marine fishes, are known to live permanently and to attain excellent condition in fresh water. The prawn (*Palæmon*), a well-known marine crustacean, has been repeatedly brought to me by hundreds and thousands, alive and well, in perfectly fresh water, and I have transferred them to their natural sea-water in aquaria without any gradual preparation, and without doing them any harm. I have known the common shore crab (*Carcinus*) and the American horseshoe crab (*Limalus*), both marine, to run about a garden for days, moistened only by rain. Oysters may be seen daily in shops in London, alive and well, immersed in fresh water. Indeed, it is evident that a large number of marine animals and plants living between tide-marks, must be capable of enduring unharmed the heavy rain which frequently falls upon them uninterruptedly during the recess of the tide; and among such creatures, and so rained upon, few are more common than the sessile barnacle which infests ships' bottoms. I have found a marine alga (*Ulva*) growing in the river Thames at Greenwich where the

water is practically fresh, and yet another marine alga (*Griffithsia*) is instantly killed by being plunged in fresh water, its colour being at the same time discharged. Mr. L. Lloyd mentions three marine fish which in Sweden and Norway are also found in fresh water, namely, the cod, the whiting, and one species of cottus. But, on the other hand, there certainly is a large number of marine animals which fresh water, or even weak sea water, does kill almost immediately as Dr. Wallich says. For example, there is a well-known passage in the late Prof. Edward Forbes's 'History of British Starfishes,' in which he relates how certain marine animals he was dredging for were paralyzed in being drawn through a thin layer of surface fresh water floating on the sea-water below. But, among the marine animals on which fresh water is supposed to act as a certain poison, none have been so constantly quoted as sea anemones. The late Dr. George Johnston, in his 'History of British Zoophytes,' 2nd edit. 1847, page 239, says, "These creatures, almost indestructible from mutilation and injury, may be killed in a few short minutes by immersion in fresh water." This work was the accepted authority on these animals for some years before the introduction of aquaria, but it is now almost useless, as far as sea anemones are concerned, and this almost universally accepted statement of Johnston's is certainly incorrect, for I have known specimens of *Actinea mesembryanthemum* thrown away by mistake as dead, and afterwards be found brilliantly expanded in a puddle of rain-water in a London garden. Mr. Gosse has lately recorded a sea anemone living in India, in one of the mouths of the Ganges, where the saltiness of the water is only about 10 in a thousand, instead of 35 parts, as on the coast of Britain. These animals are also found in the Baltic Sea, where the density is only about 15 in a thousand. The Fauna of the Baltic is a singularly mixed one. Thus, among a large number of truly marine animals (some in no way differing in size from those in the neighbouring North Sea, but others much dwarfed,) may be seen swimming the common fresh-water perch, and two species of the common fresh-water stickleback, and of these two, the perch will live if transferred to quite fresh-water, and will die if put into quite sea water; while the two sticklebacks will live quite well if removed from the Baltic water and be placed in either fresh water or fully dense North Sea water.

MR. GLADSTONE'S BILL AND THE ARCHITECTURAL PROFESSION.

WE observe an important and, we trust, inadvertent omission in an act which even the unpolitical IRISH BUILDER is forced to recognize. While care is taken that the first interests of all whose emoluments may be interfered with by the bill, from an archbishop to an organ bellows blower, we regret to observe that diocesan architects—gentlemen holding very important and trustworthy offices—are ignored. This is not as it should be. If the principle of compensation is to be recognised as just at all, all officers of the Irish Established Church, lay and cleric, are entitled to equal consideration at least, without either inadvertent or invidious distinction.

The difficulty and abstruseness of the law of ecclesiastical dilapidation, of which these gentlemen are the chief administrators, has required that the office should be filled by men of great practical knowledge, education, and sagacity; and the dozen gentlemen now holding the office may point with pride, as a proof of the mode in which they have performed their important functions, to the fact that appeals to the superior courts against their administration are almost unknown. We learn that an association has been formed to endeavour to procure recognition of the claims of diocesan architects to compensation under the act, to which Mr. Thomas Drew, the Diocesan Architect of Down, Connor, and Dromore, is secretary, and that that gentleman and Mr. J. E. Rogers (Limerick) are deputed to visit London to urge their claims.

* From the *Athenæum*.

AFTERNOON SCIENTIFIC LECTURES.

THE series of Lectures now being delivered on Saturday afternoons in the Lecture Theatre of the Royal Dublin Society will, no doubt, prove of great benefit to those privileged to listen to them. The first was on the 20th ult., by Professor Galbraith, who had for his subject "The Metric System of Weights and Measures." On last Saturday the second was by Dr. E. D. Mapother on "The Wonders of the Blood, and its Circulation." Below will be found some of the leading features of these two lectures.

On the "Metric System" Prof. Galbraith said:—

In the year 1862, a committee of the House of Commons reported unanimously in favour of the adoption of the Metric System of Weights and Measures. In the year 1864, an act of parliament, 27 & 28 Victoria, c. 117, was passed, which rendered permissive the use of Metric Weights and Measures within the United Kingdom. On the 18th May, 1868, a bill was brought in by Mr. Ewart to render the use of the Metric System compulsory within three years. This bill passed a second reading by a majority of 219 to 67, or more than three to one, and was withdrawn, at the request of Government, only because it was too late in the session, and the house was greatly occupied with the Reform Bill. The jurors of the International Exhibitions of 1851, 1855, 1862, and 1867, all agreed to recommend its general adoption by civilized countries. The International Statistical Congress, held at Brussels, Paris, Vienna, London, Berlin, and Florence, reported in favour of its adoption. There is a permanent committee of the British Association, called the Metric Committee, whose object is to forward the adoption of this system, for the sake of the benefit it would confer upon scientific investigators, engineers, and students in the various arts and sciences. The Metric System is, at present, used throughout Europe and America by a population of 150 millions of people. Nearly 60 per cent. of the total export and import trade of the United Kingdom is carried on with people using the system.

The establishment of the Metric System is erroneously ascribed in this country to the revolutionary desire for innovation which prevailed in France at the close of the last century. In the reign of Louis XIV. the inconvenience and confusion arising from the variety of weights and measures were so strongly felt, that a royal commission, consisting of Amontons, Picard, and Huyghens, was appointed to investigate the question, and report on some suitable standard for regulating the weights and measures of the kingdom. This commission was broken up by the revocation of the Edict of Nantes, which banished the illustrious Huyghens from his adopted country. During this reign and the following, several measurements of the earth were made, with a view to fix on a natural standard. In the month of April, 1790, M. Talleyrand presented a report in the first session of the National Assembly on the uniformity of weights and measures. In the following month it was decreed by the assembly, that his majesty should write a letter to the king of England, to invite his co-operation in the establishment of an international system. It was proposed that a committee, consisting of equal numbers of the members of the Royal Society of London, and of the Academy of Sciences of Paris, should be appointed by joint authority to carry out this great measure. The hostile relations which soon arose between England and France rendered the realization of this generous proposal impossible; and, accordingly, the completion of an international system mainly devolved upon the French people. A commission was finally appointed, half French and half foreign, to complete the measure. After a lapse of nine years, the final report was presented to the Corps Législatif, together with the standard meter and

standard kilogram, which have ever since been preserved in the Archives of the State.

The fundamental principle of the Metric System is that it should be International. This appears from the Report of the Academy of Sciences, signed by its president, Cordocet, and presented to the National Assembly in March, 1791, by M. Talleyrand. The report states that, after careful consideration of the question, the Academy had come to the conclusion, that every arbitrary consideration should be excluded from the proposed system; that it should not possess any feature which could raise even a suspicion of the particular interest or influence of France. In a word, the Academy desired so to frame the system, that if its principles and details alone, apart from its history, should descend to posterity, it would be impossible to divine by what nation it was designed or executed. "L'Académie a voulu, en un mot, que si les principes et les détails de cette opération pouvaient passer seuls à la postérité, il fût impossible de deviner par quelle nation elle a été ordonnée ou exécutée."

It is commonly supposed that the French people readily adopted the Metric System as established by the Republican Government. The fact is far otherwise. The opposition on the part of the retailers and artisans became so difficult to control, that a decree of the Consular Government, 13th Brumaire IX. (4th November, 1800), was passed, permitting the use of the old names for the new weights and measures. This decree only served to introduce blind confusion into all sorts of business. By an Imperial Edict, 12th February, 1812, this decree was repealed, and the "système usuel" was established. According to this system the metric standards were divided according to the old method; the scientific nomenclature abolished; the Metric System, in fact, was strangled in France, the country which gave it birth. The great Emperor was too busy with his ambitious plans of conquering Europe with the sword to bend his attention to the peaceful conquests of science, industry, and commerce, on which the true greatness of a nation depends. During the Restoration not many efforts were made to improve the social condition of France; and, accordingly, the Imperial Edict remained in force until the reign of Louis Philippe. In the year 1837, the Legislative Chambers, moved by numerous petitions, repealed the Imperial Edict, and simply re-enacted the Republican decrees of 18 Germinal III., and 19 Frimaire VIII., declaring that, on and after the 1st January, 1840, all weights and measures of any other standard or denomination than those of the Metric System should be illegal. Since that period, the Metric System, has been very generally adopted by civilized nations. Its progress after its resuscitation, as above described, has been nothing less than wonderful.

On June 18th, 1868, the North German Parliament passed an Act adopting the Metric System, and declaring its use permissive from 1st January, 1870, and compulsory on and after the 1st January, 1872.

The population of the several countries which have adopted the Metric System amounts to 176,000,000.

"The Wonders of the Blood, and its Circulation," were ably and clearly laid before an attentive audience on Saturday. By the aid of specimens, diagrams, and illustrations, the subject was rendered perfectly intelligible and interesting. Having shown that blood, or a nutritive fluid analogous to it, existed in plants as well as animals, the lecturer detailed the purposes which it fulfilled in animals, and the means by which it was renewed and kept pure. "Into the blood substances foreign to it, and excessive quantities of its fit materials may be thrown without hurt, so perfect are the organs for their separation or for their storage, according as they are wanted or not. One instance will suffice—we can't thin or thicken our blood by the quantity of water we take. If two dogs were bled to-day, and the proportions of water in their blood ascertained,

they would be the same this day month if one drank pints of water daily and the other not a drop. Spouting from a wounded vessel, blood seems a red, simple liquid, warmed with the vital heat, but how complex it is I can demonstrate by four modes of analysis. The microscope will show wonderful intricacy, the spectroscope will exhibit in it more metals than you would find in a hardware shop, chemical tests will show a score of other substances, and a few minutes after blood is drawn it will of itself separate into two, or sometimes three, constituents. Two hundred years ago Malpighi discovered that the blood swarmed with little objects in the red cells. The oxyhydrogen microscope enables us to throw on the screen an image of the human blood cells magnified many hundred times. You see they are beautifully regular discs, like coins, but so minute that they measure but 1-3,000 part of an inch across, and 80,000,000 of them could be packed in a cubic inch. They are hollow, with a wall so tough that you'll see them bear a squeezing as they struggle abreast through vessels not much bigger than themselves, and shrivel or swell accordingly as you put them in a thick or a thin fluid. They are round in all animals except the camel tribe, in which, as well as in birds, reptiles, and fishes, they are oval. They are largest in this little proteus—namely, 1-400 part of an inch long,—so that they are almost visible to the naked eye; and smallest in this musk deer—namely, 1-12,000, or only one-fourth the size of those of man. On the screen we will now show you those cells from various animals. You see they do not tally with the size of the animal, but they are proportional to the size of the bone cell of each, as I show you by these images of the sections of bone of man and of the crocodile. The size and shape of the blood cells of various animals are so definite that blood-stains on weapons or clothing can be referred to the animal from which they came, and this knowledge has helped to detect the murderer or acquit the wrongly accused." [The appearances shown by blood and the various metals it contains were then exhibited by the spectroscope.] A test just discovered in Australia shows extraordinary small quantities of blood in stains, even twenty years old. It is a mixture of tincture of guaiacum and peroxide of hydrogen, and you see with blood a beautiful blue colour is developed. If water alone were to circulate through our vessels, it would ooze out and make us dropsical, but 'blood is thicker than water,' because of the albumen it contains, and therefore stays in the vessels. You see when I heat the fluid of the blood a white mass is separated, just as from white of egg, and this is albumen, the model feeding principle. Of the composition of the blood of animals I will only further say that it is identical with that of their flesh, as proven by Dr. Playfair, now member for Edinburgh University. For that and many other reasons in 1863 I advocated the keeping of blood in the carcasses of the animals we slaughter. Dr. Foot has lately told us that the lions in our Zoological Gardens are fed with flesh in which the blood is retained. They have enriched the society with numerous healthy cubs, while the lions in the London Gardens, fed on meat butchered in the usual way, have produced a scant, deformed, and sickly progeny. The composition of the blood varies surprisingly in different diseases, and thus physicians are led to hope that with the invaluable aid of chemistry the cause and cure of many an obscure and fatal malady will be discovered. The paleness of the consumptive, the bloatedness of the apoplectic, and the yellowness of the jaundiced notably indicate changes in the quality of the blood; but the most profound alteration occurs in cholera, more than two-thirds of the water of the blood being removed. The avidity with which the supply of water is sought to be replenished is shown by the fact that when cholera seizes a person suffering dropsy that disease magically disappears. The blood may be invaded by parasites, for a little animal, the distoma hematobium, and a plant, the bacterium, have been often found

in it, the latter probably causing, in the ox, a long list of diseases, of which splenic apoplexy is the gravest. Under this microscope you will see ox blood infested with bacteria. The scientific study of the diseases of lower animals would so greatly benefit human medicine as well as promote the agricultural interests of the country, that I greatly regret the Science and Art Commission have not advised any plan for teaching the veterinary profession in Ireland. That the blood of the ox affected with splenic apoplexy may infect man was proven by a case which Professor Ferguson showed me last month. If we allow ourselves to theorise we may fancy that all catching diseases are owing to parasitic invaders of a special kind for each contagion. The resemblance of fermentation to the spread of what we call zymotic diseases favours such a theory. Exclude the yeast plant from syrup and it remains unaltered; but add one of these microscopic plants and millions of them will be developed at the expense of the sugar. In the same way keep, by a cordon, an ox free from all chance of contagion, and his blood is safe; but into it introduce a drop from the veins of a second ox with cattle plague and the contagion of that pestilence will become multiplied so many millions of times that all the herds of Europe might be infected from it. Of small pox, and some other poisons which afflict man, the story is the same, for by them

"The life of all his blood
Is touched corruptibly.
... And there the poison
Is, as a fiend, confined, to tyrannise
On unreprieveable, condemned blood."

In another play, also, Shakspeare describes with marvellous skill a blood-poison,

"Whose effect
Holds such an enmity with blood of man
That, swift as quicksilver, it courses through
The natural gates and alleys of the body,
And with a sudden vigour it doth posset
And curd, like eager droppings into milk,
The thin and wholesome blood."

That Shakspeare had a kind of foreknowledge of the circulation which Harvey discovered a quarter of a century after would appear from many passages in his works. For instance, the following is a most accurate account of the course of the blood in fainting, as well as of the fit restorative from that condition:—

"O Heavens!
Why does my blood thus muster to my heart,
Making both it unable for itself,
And dispossessing all my other parts
Of necessary fitness?
So play the foolish throngs with one who swoons;
Come all to help him, and so stop the aid
By which he should revive."

In different races the composition of the blood varies, but this depends more on such circumstances as food and air than upon hereditary characteristics. I am sure no chemist could distinguish "the blood of all the Howards" from that of the humblest peasant if both were for a while dieted alike. In the blood of the thorough-bred horses there is less fibrin than in that of the hackney, but this is owing to the pampered life of the one and the toilful life of the other. . . . In clotting, blood gives off ammonia, as I could have shown by holding a little hydrochloric acid over this blood just after its removal from the ox. For the essay in which this fact was announced, Dr. Richardson, of London, obtained the Astley Cooper prize of £300; but in the writings of the Hon. Robert Boyle, in 1684, the fact is mentioned. The fact that the blood drawn by a leech does not clot has often puzzled me; but I think it is due to the smallness of the puncture made by the animal's teeth, for the blood is so slowly delivered that time is allowed for the surrounding tissues to pick out the fibrin. Clotting is all important, for without it the slightest wound would be fatal. If one of our Vartty pipes bursts—a phenomenon you may have witnessed—out the water squirts, till the plumber stops the breach; but a wounded artery is plugged by the clotting of the blood most effectually, as you will see by this specimen and this enlarged representation of it. . . . You have all probably heard that loss of blood in one person may be made good from the vessels of another—that, for instance, the dying wife may revive if her

husband lend his blood. Such an heroic individual should be well fed for his own sake, as the loss will be more readily borne, and for the sake of her to whom he devotes his blood, for that fluid from a fasting person is poisonous rather than revivifying. With equal absurdity and irreverence this transfusion was at first looked on as a means for indefinitely prolonging existence, but it has saved many lives, and has added some hours of inestimable value to the lives of cholera victims."

A NOVEL IDEA FOR A RAILWAY BETWEEN DOVER AND CALAIS.

For some years past, there has been a considerable amount of attention directed to the probability of effecting a communication between England and France without the necessity of undergoing what to so many persons is regarded with feelings of aversion—the short sea passage. The idea of making a tunnel under the Straits of Dover was suggested to Napoleon I., but then the scheme merely contemplated a carriage way and footpaths on each side of the road. It was not a pleasant idea, that of a ride in a diligence or a stage coach through a tunnel twenty miles in length, or a walk across for those who preferred to make the journey on foot. It was nevertheless looked upon with favour by the First Consul, and plans and sections of a most elaborate character were duly prepared and deposited in the archives of one of the public offices in France. In 1857, M. de Gamond prepared, with great elaboration, his plans for a tunnel, *sous marin*, between England and France, showing the position and dimensions of the various shafts, and plans of a central dock, to be constructed in the Straits. Mr. Remington, an English engineer, also prepared plans on the same subject, and Mr. Hawkshaw, the engineer, has for some time past been engaged in taking preliminary soundings and surveys for a tunnel. A distinguished French engineer, desirous to avoid making a tunnel, boldly suggests the construction of a bridge across the Channel. To this list of projects may now be added one which shows that in the matter of crossing the Channel more than the usual three courses which are applicable to every matter are available. The Channel, for instance, may be crossed above by means of a bridge, upon it by steamer, and beneath by a tunnel. A fourth mode proposed is that of going neither above, upon, nor below, but through the body of water in the Straits. It is proposed to build a tube, sink it partially, and support it in the water in such a manner as to admit of the passage through it of trains or a double line of railway. A more daring engineering scheme was probably never suggested, but we are assured by the *Railway News* that the designer, Mr. Purkis, has been for some months past engaged in calculating the weights, strains, dimensions, pressure of every portion of the work, and devising means of constructing, fitting, and putting together this extraordinary work. It is proposed that the iron tube for the railway shall be laid across from the English to the French coast, and be supported at a depth of about 50 ft. below the surface of the water by iron stanchions or tressels, the feet of which will rest upon the bed of the Straits. The tube is to be in its outside diameter 23 ft. 6 in., and with a view of giving it sufficient strength to resist the pressure of the weight of water; to sustain the weight of the trains between the points of support; and to allow for the decay caused by the action of the water, the tube is to be of cast iron 8 in. in thickness, being nearly twice the thickness of the armour plates of the Warrior iron-clad. The length of the tube between each pair of legs or supports is to be 300 ft., and the weight of each of these sections 3,000 tons. Each of these lengths of 300 ft. is to be made up of eight segments of 37 ft. 6 in., and these are to be firmly bolted together by means of 100 steel bolts passing through the internal flanges of each length of tube. Ask the bold engineer how these segments are to be put together in the water,

and he explains the matter in the most practical manner. Each segment will be made water-tight, by a bulkhead, and will be lowered until it is brought into exact position with the portion previously fixed, and when made fast by the bolts the near bulkhead will be removed, and the workmen will pass on to the next section. The stanchions which will have to carry the tube are made, as it may be supposed, of enormous strength. They will vary in length according to the depth of the water. The largest will be 106 ft. in length; it will be formed hollow, tapering from each end to the middle, when it will be 7 ft. 2 in. in diameter, the ends being 5 ft. 8 in. in diameter. They will be cast in three pieces, and bolted together by cast steel bolts or inside flanges. The weight of each of these legs, or stanchions, will be 454 tons. In order to give them a sure foothold at the bottom of the sea they will be fastened by bolts to discs of metal 25 ft. in diameter, and weighing 85 tons. To prevent any lateral motion, the feet of these stanchions will be held together by tension bars 100 ft. long, and weighing 60 tons, and a similar tension bar, though of less length, will connect and hold the stanchion at the upper extremity. The bolts that are to hold and keep the stanchions apart weigh not less than 4½ tons each. The transverse strength of the tube when completed has been satisfactorily ascertained to be 27,034 tons, and if loaded in the middle it would safely carry 2,000 tons weight. In order to sink the tube, each section of 300 ft. will be loaded with 433 tons of rails, air and water tubes, and of 1,800 tons of ballast or shingle, each segment as it is lowered being provided with its due share of dead weight, to ensure the necessary displacement of water. The pressure of the flow of the tides will be equal to 450 lb. on every square foot of the cross sectional area, but the stanchions are calculated to be of sufficient strength to resist any movement from this cause. The ventilation of the tube is to be provided by stationary steam power at one of the entrances to the tube, which will force a sufficiency of air through a channel constructed along the inner roof of the tube to a point about midway of its entire length, where it will be discharged, and force itself along the tube to either end, providing at the same time a perfect system of ventilation. The draining of the tube is duly provided for; the water will be collected in the lower part of the tube, and as the locomotives pass through they will take up the water in a trough, in the same manner as the engines are supplied on the London and North-Western Railway while travelling. The casting of the various portions of the work is to be done in a dock to be formed on the coast, and the various portions, as they are cast, are to be floated by letting in water, and taken out to sea by pontoons, to which they will be attached by suitable chains. The cost of this extraordinary work is set down at from ten to fifteen millions.—*Observer*.

ANCIENT IRISH ART.

THE following remarks on a recently-issued illustrated work appeared in the columns of a morning journal, and are, we believe, from the pen of Lady Wilde, whose contributions to our national literature have been favorably noticed. The work embraces *fac similes* of the principal illuminated Celtic manuscripts which are scattered over Europe. Only 200 copies have been printed; the cost of each copy is £25, and we learn that the Royal Irish Academy will secure one for its library.

In a learned preliminary dissertation, Mr. Westwood gives his views on the origin and development of Hiberno-Saxon art, and his work, he says, may be considered as the first chapter of the history of the fine arts in these islands from the Roman occupation of Great Britain to the Norman Conquest—that is, for the first thousand years of the Christian era. In the ornamentation employed by Irish and Saxon artists he finds, as has been already observed by the best antiquaries, Kemble and others, distinctive peculiarities wholly different from Continental art; an *opus Hibernicum* and an *opus Anglicum*, but the Irish the more perfect of the two.

The earliest manuscripts of Greece and Rome show

nothing like this distinctive Celtic art; nor the Italian mosaics, nor the wall paintings of Herculaneum or Pompeii—beautiful as are the representations of the human figure found there; nor does Byzantine art afford any similar types. From whence, then, did the Irish, the acknowledged founders of Celtic art in Europe, derive their ideas of ornamentation? This is one of the historical mysteries which, like the origin of the Round Towers, still awaits solution. One must travel a long way, even to the far East, before finding in the decorations of the ancient Hindoo temples anything approaching to the typical idea that runs through all Irish ornamentation. It is, however, an incontrovertible fact, and one proved to demonstration by Mr. Westwood's learning, labour, and researches, that at a time when the pictorial art was almost extinct in Italy and Greece, and indeed scarcely existed in other parts of Europe—namely, from the fifth to the end of the eighth century,—a style of art had been originated, cultivated, and brought into a most marvellous state of perfection in Ireland absolutely distinct from that of any other part of the civilised world; and which, being carried abroad by Irish and Saxon missionaries, was adopted and imitated in the schools of Charlemagne, and in all the other great schools and monasteries founded by them upon the Continent.

The peculiarities which characterise true Celtic art, whether in stone, metalwork, or manuscript illuminations, consist in the minute and excessive elaborations of intricate ornamental details, such as the spirals, the interlaced ribbands, and the entwined serpents and other animal forms so familiar to the students of our national art-treasures in the Museum of the Royal Irish Academy. These forms are invariably found in all Irish decoration. The initial letters and ornamentations of the ancient manuscripts are reproduced in the gigantic stone crosses and the more delicate metalwork of the shrines and reliquaries; and from this identity of ornamentation the age can be determined of all art-monuments or remains, and objects readily classified as contemporaneous. The Irish adhered with wonderful fidelity to their peculiar art ideas for at least eight hundred years; and while the Saxons quelled with Frankish art, and finally gave themselves up wholly to Norman influence, the Irish continued their exclusive devotion to the ancient and national Celtic type. Intensely national, indeed, were those early artists; they gave ideas to the world, but received none in exchange. In their pictures Goliath appears as an Irish warrior, and David bears an Irish harp in his hands; while our Lord himself, in one of the Irish sculptures, is represented wearing the Irish dress. When the nation fell under Norman sway, in the twelfth century, Norman ideas naturally became triumphant; but everything that is most beautiful and interesting in antique Irish art belongs to the pre-Norman period—the gold ornaments, the gorgeous manuscripts, such as the Gospels of Durrow and of Kells; the grandest of the sculptured crosses, Cormac's Chapel, that architectural gem of western Europe; the richly-decorated shrines, such as that of St. Monchan, the most important ancient shrine now in existence in these islands, Mr. Westwood says; and specially interesting to us Irish from the recorded fact that it was covered with pure gold by Roderick O'Connor, the last king of Ireland, and was, as the Annals state, the most beautiful piece of art ever made in Erin. All these evidences of high cultivation and artistic skill were in existence long before the Norman adventurers set foot on our shores. Irish art, however, died out with Irish nationality; and in two centuries or so, after the Norman Conquest, it ceased to exist, and was replaced by the pseudo-Roman or Irish Romanesque style. Irish art can be easily traced throughout the Continent by the peculiar ornamentation which characterised it; and wherever, amongst the early manuscripts in foreign libraries, one is found surpassing all the rest in the singular beauty and firmness of the writing, and the exquisite delicacy of the minute and elaborate illuminations, there at once an Irish hand is recognised as worker, or an Irish intellect as teacher. The same symbols and ideas run through all of them; there are the same strange, elongated, contorted, intertwined figures; the same rich mosaics of interlaced lines, so minute, so delicate, so rich in brilliant colours, that the border of the page seems powdered with crushed jewels. There is something almost melancholy in this devotion to a species of art in which there was nothing to stimulate the feelings or to warm the heart. No representations of Nature's glories in tree or flower, or the splendour of human beauty, the artist's aim being rather, it would seem, to kill the human in him, by forcing his genius to work only on the cold abstractions of spirals and curves, and endless geometrical involutions, and the infinite monotony of those interlaced lines, still coiling on, for ever and ever, through the centuries, like the windings of the serpent of evil, which they have been meant to symbolise through the successive generations of our fated humanity. Truly, these artists offered up the sacrifice of love. Their lives and the labour of their lives were given

humbly, silently, reverently, to God, and the glory of God's Word. They had no other aim in life, and when the work was done—a work so beautiful that even now the world cannot equal it—there was no vainglorious boast of himself came from the lips of the artist worker; but the manuscript ends with some simple devotional words, his name, and the desire to be remembered as the writer, like the *orate pro me* on the ancient tombstones; and this was all he asked or hoped for in return for the years of youth and life he had incarnated in the illuminated pages of the Gospels. For in those early ages art had no existence save in union with religion. Humanity brought together all its most precious ointments to pour upon the feet of Jesus. In Ireland especially—the Island of Saints—whatever genius could devise or the hand of the artist could execute was lavished upon some work that would recal the presence of God to the people, stimulate His worship, or make known His word; upon the Psalters, the Gospels, the crosses, the costly shrines, the jewelled cases for a saint's relics, the golden covers for the holy books. But nothing of that period has come down to us that shows a luxury in domestic life. The Word of God was shrined in gold, made rich with gems and enamels, but the people lived their old simple life in their old rude huts; and even the kings gave their wealth, not to erect palaces, but to build churches, to endow abbeys, to help the cause of God, and speed the holy men who were His ministers in their crusade against evil, ignorance, and darkness.

It is no idle boast to say that the Irish were the teachers of Europe from the seventh to the ninth century in art and religion. Mr. Westwood has visited all the great libraries of England and the Continent, and found abundant evidence that Irish art, or Hiberno-Saxon art, was diffused over Europe during that period. The Greek and Latin manuscripts are not illuminated, but are adorned with intercalated pictures; Irish art differs from them in many respects—amongst others, in having the figures and rich ornamentations printed on the leaves and borders of the book itself. He has given *fac similes* from Irish manuscripts now existing, in the libraries of Oxford, Cambridge, Durham, Lichfield, Salisbury, Lambeth, the British Museum, and other places; and, passing to the Continent, has laid under contribution the great libraries of Paris, Rome, Boulogne, St. Gall, Milan, Rome, Munich, Darmstadt, Stockholm, Copenhagen, and even St. Petersburg, and thus proved the excellence to which Irish artists, or Saxon artists educated in Irish schools, attained more than a thousand years ago. Nor is it strange that Ireland should have been the teacher, considering its early Christianity, which had made some progress amongst the people even in St. Jerome's time; a little later amongst the Britons; but at the end of the sixth century Augustine and his monks found the stolid Anglo-Saxons still in the bonds of their ancient Paganism and Wodenism. The Gothic race received the Christian faith gladly, as early as the fourth century; so did the Celtic; but it was a difficult matter to bring light to the Saxon soul. It has at all times proved itself rather opaque in nature. The Saxon tribes of Germany did not renounce their idols till forced to it by the strong coercive power and keen sword of Charlemagne, in the latter half of the eighth century.

With Christianity came to Ireland the knowledge of letters; at least no older inscription has been found than that on the pillar stone of Lughnaden, St. Patrick's nephew, which may still be seen beside the ruin of St. Patrick's oratory in one of the beautiful islands of Lough Corrib; and the oldest manuscript existing in Ireland is the Book of Armagh, a copy of St. Jerome's Latin version of the Gospels written in the old Roman letters, and very valuable for the beauty of the writing and the various drawings it contains. Learning was at once consecrated to the service of God in those early days, and to multiply copies of the Gospels was the praiseworthy and devout task of the first great teachers and missionaries. The Book of Durrow and the Book of Kells, both of the early part of the sixth century, are believed to be the work of St. Columba himself. The latter, the Book of Kells, has filled all critics with wonder and admiration. It is more decorated than any existing copy of the Gospels, and is pronounced by learned authorities to be, 'the most beautiful manuscript in existence of so early a date, and the most magnificent specimen of penmanship and illumination in the Western World.' They are both written in the Latin uncial character, common to Europe at the time; and here it may be noticed, in passing, that the so-called Irish alphabet is simply the Latin alphabet modified by the first missionaries to suit the Irish sounds, as Iphigalia, the apostle of the Goths, invented an alphabet of mingled Greek and Latin characters, in order to enable him to make his translation of the Gospels into Gothic; and, as the Greek missionaries

invented the Russian alphabet, which is a modified form of the Greek, for a like purpose. That the Irish should retain the old form of the Latin letters, while most of the other nations of Europe have discarded it, is to be regretted, as nothing would facilitate the study of Irish so much at the present day, when one has so little leisure to spell out with much painful endeavour the barbarous symbols of a by-gone age, as the adoption of the modern English alphabet.* The first Irish book that ever was printed appeared in 1571, and is now in the Bodleian Library. It is a catechism of Irish grammar, and the Irish alphabet has suffered no modification or improvement since. It was about the end of the sixth century that the fame of Irish learning and the skill of Irish artists began to extend to England, and from thence to the Continent; and Irish scribes were employed to make copies of the Gospels and teach the splendid art of illumination in the English monasteries. From that period till the end of the ninth century the Irish were a power in Europe from their learning and piety—eminent in Greek as well as Latin, and the great teachers of scholastic theology to the Christian world. The Gospels of Lindisfarne, executed by monks of Iona in the seventh century, and now "the glory of the British Museum," form a most important element in the early history of Celtic art, as this book seems to have been the principal model for succeeding artists.

The Irish can be tracked, as it were, across Europe by their illuminated footsteps. They were emphatically the witnesses of God, the light-bearers through the dark ages, and, above all, the faithful guardians and preservers of God's sacred Word. A hundred years before Alfred came to Ireland to be educated, and went back to civilise his native country by the knowledge he had acquired here, the Christian schools of Germany, under the direction of Irishmen, had been founded by Charlemagne. Through France, along the Rhine, through Switzerland, Italy, and Spain, the Irish missionaries taught and worked, founding schools and monasteries, and illuminating by their learning the darkest pages of European history. One of the greatest treasures of the Imperial Library of Paris is a beautiful Irish copy of the Latin Gospels. The College of St. Isidore, at Rome, possesses many Irish manuscripts, one of them a Psalter, folio size, written throughout in letters a quarter of an inch long, and which is considered to be the finest of the later works of the Irish school. The celebrated Golden Gospels of Stockholm are of Hiberno-Saxon art of the ninth century. This book has a singular history. It was stolen from England, and disappeared for ages, but finally was discovered at Mantua in the seventeenth century, and purchased for the Royal Library at Stockholm. St. Petersburg also possesses a highly-illuminated copy of the Gospels, which was taken from France at the time of the great Revolution, and found its way to the far north. It is a perfect and beautiful specimen of the Irish style of the eighth century, and the initial letters can only be compared to the Book of Kells. All these Irish manuscript Gospels are, without exception, copies of St. Jerome's Latin version. No Irish translation of the Gospels has ever been found. Learning was evidently considered a sacred thing, indispensable for the priesthood, but not necessary for the masses; yet it seems strange that while the learned and pious Irish saints and missionaries were devoting their lives to multiplying copies of the Gospels for other nations, and disseminating them over Europe, they never thought of giving the people of their own land the Word of God to read in their own native tongue. The leading Teutonic races, on the contrary, with their free spirit, were not satisfied with accepting the doctrines of the faith simply as an act of obedience to their teachers. They demanded the right of private judgment, the exercise of individual reason, and the Gospels were translated into Gothic as early as the fourth century by Bishop Ulphilas for the use of the Gothic nation.

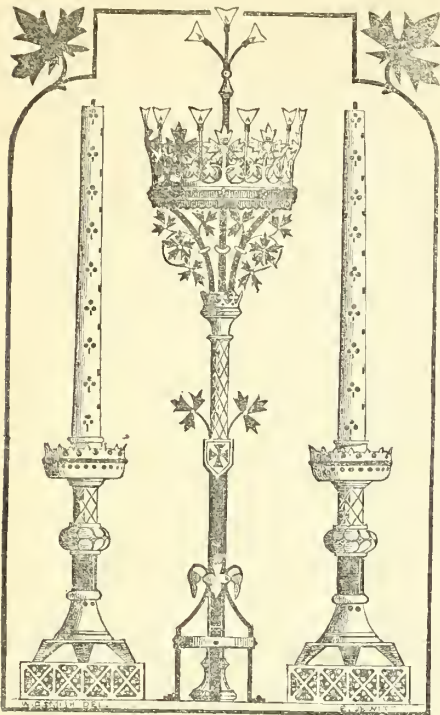
This remarkable book, called the "Codex Argenteus," is now in the Royal Library of Upsala, having, after many dangers and vicissitudes, at last found its way to the people who hold themselves the true descendants of the Goths, and whose king still bears the proud title of "King of the Swedes, Goths and Vandals;" and an edition of it, with annotations, has been published recently by the learned Professor Andreas Upstrom, of Upsala.

Towards the close of the tenth century the Frankish style of ornamentation—a blending of the Classical and the Byzantine—had almost entirely superseded the beautiful and delicate Celtic art both in England and on the Continent, and about the fifteenth century it disappeared even from our own Ireland, the country of its origin. The gorgeous missals and illuminated Gospels, instinct with life, genius, holy reverence, and patient love, were destined to be replaced soon after by

* In the *Celtic Journal*, an admirable periodical recently started at Manchester to perpetuate the study of Irish, the Irish lessons are printed in the modern characters—an innovation welcomed by all students.

* See Sir William Wilde's "Lough Corrib and Lough Mask," page 136.

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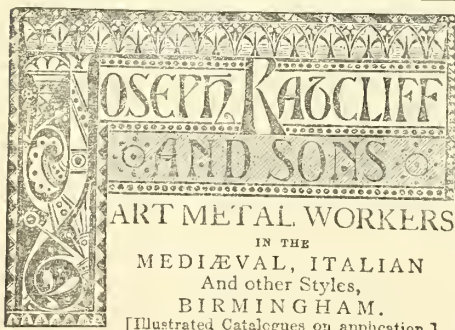
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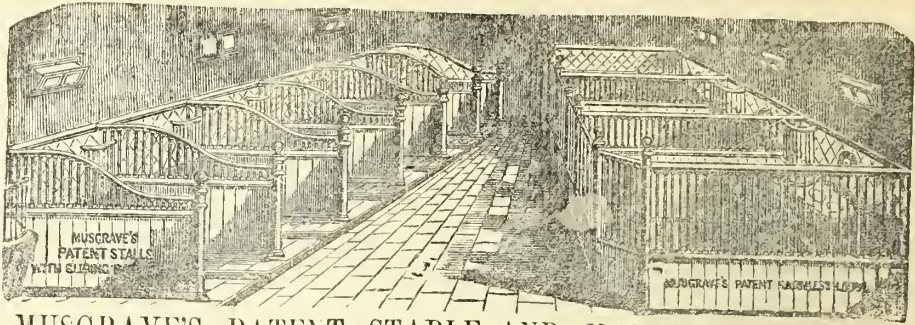


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(SOLE AGENTS FOR IRELAND.)

The Irish Builder.

VOL. XI.—No. 224.

Belfast Municipal Buildings.



N giving a notice of the designs sent in for the proposed Municipal Buildings at Belfast, we purposely deferred our critical remarks upon the several plans until the Belfast Town Council had made a selection according to the conditions. As, however, six months have now elapsed since the time of advertisement, & neither any selection nor award has taken place; and as, moreover, there are portentous signs from the dust, dirt, and dilapidation accumulating about the exhibition of drawings—not to speak of this as a type of the more disgraceful dirtiness that characterises the conduct of the Belfast Town Council in this matter, whom no dirt can make dirtier—we proceed, in the interests

of the competitors and the architectural profession, though under considerable difficulties, to give notes on the several designs. The portentous signs to which we refer, and the difficulties under which a quiet inspection of the plans is precluded, are the knocking and hammering that are going on to prepare the room for meetings, and the constant interruptions of various functionaries and officials, and the preposterous comments on the plans proceeding from a scavenger, a chimney sweep, and various rag-tag and bobtail. We venture to say that had the drawings been hung out in the street, or plastered in the preposterous manner of the voting lists on the outer walls of that ultra-detestable building in which this very sapient council sits, like a snail that will not venture far out of its shell,—these drawings, the result of so much skilled thought and patient industry, would have met with more respect.

It is to be distinctly understood that we look upon it, that the main cause of the Belfast Town Council having blundered into this quagmire, has resulted from their incompetence to deal with the question. If improper influence has been used, or undue advantage taken of that incompetence, it has been from the reprehensible hesitation and delay that has taken place. Delays are always dangerous. The only honorable and business-like course would have been, immediately after the last day for receiving designs, to have taken them promptly into consideration, adjudicated on them with or without professional aid, awarded the prizes, and not exhibited the plans to the public until this had been done. It may appear a show of impartiality to have at once displayed the drawings to the rag-tag and bobtail before mentioned. Actually, however, it is simply

an exhibition of the incompetence and coarseness of the Belfast Town Council, and a degradation and an injustice to the architects.

But we must, before the drawings now on exhibition are bundled into the waste-paper basket—which, to judge from their treatment, seems to be their destiny,—proceed to give some notice of the designs. We will begin at the left-hand side, following them as hung in the room, if it be possible to do so. We may remark that the numbering of the sets of drawings attached to them by the Corporation, although perhaps having some clue in the inscrutable mind of the Council, is utterly incomprehensible and higgledy-piggledy to others. To follow the numbers is a game of hide and seek, quite refreshing—not, we mean, to the architects. Some of the numbers are missing, some are divided; now a drawing is at this end, and now at that end of the room; whether to look for it up the chimney or in the dust-hole is doubtful, though probable. All the plans exhibited may be said to be in a dust-hole in one respect, namely—amongst the dust and litter of the council-room, as was the case on the occasion of our visit, for we had to stumble over fenders and fire-irons and bundled up carpets, and to rake up plans from amongst the dirt in order to inspect them.

The first drawing to the left (though there is one on the mantle-piece out of its place in the set) is No. 27—S. M. Cooper, C.E., Belfast. Mr. Cooper sends twelve drawings. In his plan for the Municipal Buildings, the various offices are arranged around a courtyard or central hall. In this arrangement there would be considerable facility for future extension. The Courts of Justice are well planned. The position of the council room is open to objection, being too much in the public street. The elevation is neatly drawn.



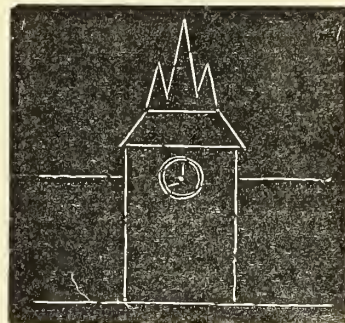
The style is Gothic. The main building has a central tower and clock, somewhat of the proportion of No. 1. The detail is too insignificant, though the main outlines are good. Mr. Cooper should acquire greater breadth and simplicity of treatment.

No. 24—Mr. Livingstone Macassey. This is a Gothic design. It has a central tower (No. 2, as far as proportion goes). We hope competitors will not be hard upon us, considering the difficulties to which we have alluded. This design consists of eighteen drawings, most of which we had to exhume from lumber and dust on the floor. Under these circumstances, we regret not being able to examine the plans as they deserved: they ought not to have met with this fate. The Municipal Buildings are L-shaped on plan, which leaves great facility for future extension. The central offices, lit by borrowed lights, are not as they might and ought to be.

No. 9—W. Milne. Several of the plans illustrating this design being amongst rubbish and dust on the floor, we hardly could do that justice to them that we otherwise might. As

to the elevations still hanging upon the wall, we cannot say that our impressions were very favourable; they are drawn considerably out of upright. It may be that their author designs that they should be built thus, which, although sensational in effect, is not new, for we have the example of the Leaning Tower of Pisa. It is not, perhaps, in good taste to build thus, whatever it may be to draw so. In the front towards Chichester-street there is an amazing representation of a dome, consisting simply of a dab of colour from a brush, of irregular outline, and a stroke of a pen at the top, prefiguring or signifying dome. If we mistake not, the tower proposed in Victoria-street is after that of the Hull Town Hall, by Mr. Cuthbert Broderick, with the exception of the leaning effect. There is one noticeable feature in the plan, which does not appear in any above, namely, the council chamber being at the rear of the building, which is quite right.

The next set is one of six elaborate drawings by J. Entwistle. There are no elevations visible. In this arrangement the council chamber is rightly planned.



No. 25—Ewart. It was very difficult to examine the plan of this design. The elevation is Gothic. It has a central tower of the proportions of No. 3.



No. 3—O'Neill and Byrne. This is an excellent set of drawings. The elevations are of an Italian character. The general arrangement of the Municipal Buildings is somewhat like No. 4, the effect being capital. The elevations of this design are drawn in a masterly style, and do great credit to the authors.



No. 2A—Boyd & Batt. Here is a very elaborate set of drawings. Even if the elevations had been good, the awful tint of color in which they are represented would have marred them. They look something as though they had been painted with the yolk of an egg beaten up. There is what surely must have been intended as a joke. The top of the main tower is like No. 5. A man holding a flag; perhaps the fact of the ground on which these buildings are proposed to be built being often used by acrobats and showmen may have suggested the idea.

We shall continue the article in our next. With regard to the Gothic of the last-named design, it is really terrible. There is a fine

building now almost completed in High-street, Belfast, somewhat in the modern Parisian style of street architecture, by the same architects. How the same authors could have been guilty of the design in this competition, is astonishing. They evidently do not enter into the spirit of Gothic much further than a cast-iron chimney-piece. We say this in no disparagement whatever of the architectural abilities of the gentlemen in question, but in deprecation of that sectarian art-spirit which often fetters men. Let the architect design in whatsoever style pleases him, and in the way that he best can. The bugbear of "style" seems to have here haunted the mind. Let the plan be worked out without any "Classic," "Gothic," or "Italian" preconception, and the elevation follow as the natural conclusion of a mathematical problem.

MECHANICAL ARTS.

(Continued from page 77.)

FORGING.

THE process of forging consists in the heating of wrought iron, and in the pressing or hammering of it out while hot, into any desired shape. The ordinary smith's forge is so well known that it scarcely requires any description. It is furnished with a hearth, bellows, anvil, vice, water-trough, and tongs and hammers of various sizes. The fuel used is coals, which must be of the purest quality, for, should it contain sulphur or other impurities, the iron cannot be welded, or otherwise worked efficiently. The coals are broken into small pieces and wetted with water before being used, so that when heated they cake and form a kind of shell round the fire which obstructs the free escape of the air and heat.

The air is forced through the fire by means of a fan or bellows. The fan has been already described under the head of "Iron-founding." The bellows in appearance is familiarly known to every one, though its working principle is not so generally known. The bellows consists of two compartments contained between three boards, the centre board being immovable, the other two boards being movable, and hinging on their narrow ends. The compartments are made air tight by pieces of pliable leather nailed along the edges of the boards. There is a valve opening upwards in the boards under each compartment. The upper compartment communicates with the fire on the hearth by means of a pipe. When the under board is lowered, the air rushes in through the valve and fills the enlarged space in the under bellows; and, when the board is raised, this air is forced through the valve of the centre board into the upper bellows which is immediately enlarged until the air escapes through the fire, when it again collapses, until it is supplied with a fresh charge from the under bellows. There is a weight placed on the upper bellows which keeps a constant pressure on the air in it, so that by this means the fire is supplied with a continuous blast.

The pipe or nozzle of the bellows is not carried into the fire where it would be burnt away, but terminates in a perforated lump of metal called the "tew-iron," which comes in direct contact with the fire. Tew-irons are in some cases made hollow, so that the pipe which conveys the blast to the fire may be surrounded with water, and thus always kept cool. Though this form of tew-iron cannot

contain much water itself, it is connected with a larger vessel by means of two pipes, one of which conveys the cold water from the bottom of the vessel to the bottom of the tew-iron, the other pipe conveys the hot water and steam from the top of the tew-iron to the vessel.

The anvil on which the iron is beaten out weighs from 2 to 4 cwt. In forging light work two men only are required, the principal workman being the "smith" who manages the work both in the fire and on the anvil; he uses a hammer of about 2½ lbs. weight, with which he directs the "striker" or "hammer-man" where to strike the work. The striker uses a hammer of about 10 lbs. weight unless the work happens to be heavy, when he uses a hammer of a larger size, he has also to blow the fire. When the forging is not of any length, a tongs is required to hold it. The tongs are made of various forms to suit the shape and size of the forging. The smith also requires a number of "swage blocks" of various sizes and patterns for finishing the forgings. These swage blocks are made in pairs, one of the blocks being fixed in a square hole in the anvil, and on which the work is laid; the other block is held over the work and hammered down on it, so that the forging is pressed into the vacant space between the two blocks, and thus receives its finished form.

The fire is regulated to the size of the work, and whenever the blast breaks out through the coals, the opening is instantly closed up again, and the coals beaten compactly all round the fire. The heat the iron receives is judged of by the eye, and may be divided into three degrees—these are the red heat, the white heat, and the welding heat. To ascertain the heat, the work is partly drawn out of the fire, and quickly thrust back again if not hot enough. In forging, the iron may be said to undergo three processes—these are, "drawing out," "thickening," and "welding." These operations are also denoted by other terms. In altering the shape of iron, the lowest heat used must be the white heat, for if it be much hammered without being sufficiently hot it splits and cracks. In drawing out or reducing, the hammer strikes the bar of iron on its sides; but in thickening or upsetting, the hammer strikes the bar on the end of the grain. In welding or building up it may be either the side or the end of the grain that is joined together.

When two pieces of iron are to be united together by welding, the surfaces to be joined are first roughed or scarfed, both pieces are then brought to a welding heat, which is discerned by the sparkling of the iron, and its becoming covered with a glaze like varnish. Care must be taken that the iron is not heated so much as to run or be "burnt," as in that case the piece so affected will have to be cut off, being so brittle as to have lost the properties of wrought-iron. Both pieces must be equally heated, which is attained by turning and moving the pieces in the fire—the coldest piece being always kept in the hottest part of the fire. A mixture of powdered glass and sand is dusted over the surfaces to be joined before removing them from the fire. When both pieces have attained an equal and sufficient heat they are taken out, and the melted sand and other substances adhering to them are removed; they are then laid together on the anvil and hammered gently at first while the iron is soft, but the blows increase in force as the iron hardens.

The two pieces are thus firmly united into one.

Heavy forgings are heated in air furnaces, and shaped by a steam hammer; the control over the hammer and the work being so perfect that huge forgings can be made to the most precise dimensions.

THE NEW LIFE BUOY.

THE improved life-buoy, invented by Commander Bouchier, consists of an air-tight, oval, thin metal casing, about 18in. deep and 6in. across, forming a double cylinder, and having a central space of 18in. by 16in. open from top to bottom, for the reception of the person or valuables to be saved. The interior of this casing is divided into two parts by a partition of metal, which is about 14in. from the top giving a contents of about three and a-half cubic feet, and leaving a space of 4in., which is to be used as a reservoir of fresh water by the person saved from drowning, in the event of his being compelled to remain adrift for some considerable time. This waterspace has two tubes leading to the top of the buoy, which are fitted with india-rubber nozzles, or mouth-pieces. The air-tight casing is sheathed with wood batteus, tongued together, to afford protection against the stem of a boat, and to prevent the metal being bulged if it strikes the side of the ship in hoisting. This casing is enclosed in an open framework of iron or steel connected by rivets, having a grating or small platform at the bottom, on which the man stands. As the grating is about 3ft. from the top of the buoy, the man's vital organs are kept out of the water. The apparatus is further provided with two stationary hollow tubes or sockets, about 1½in. in diameter, passing from top to bottom, each containing a signal staff for the purpose of indicating the position of the apparatus to the man in the water, and to facilitate its recovery by the ship to which it belongs, or for attracting the notice of passing vessels. Each signal staff is telescopic, being formed in two or more parts or sections fitting the one in the other, the whole being contained in the stationary socket. The signal staff is automatically raised out of its socket on the buoy being let go by means of a weighted rod sliding in the stationary socket. To these telescopic masts or staffs are also attached portfires or fuzes to serve as signal lights, one being ignited by the action of letting go while the other is at the service of the man in the buoy. The upper part of the buoy floats 6in., and when a man is in it, about 2½in. out of the water. The signal flag is about 7ft. from the water. The outside size of the buoy, made of an oval shape, is about 32in. by 30in. by 36in. deep, tapering from the top, so that the platform is about 16in. by 15in.

Arrangements have been made by which this apparatus can be suspended either inside or outside the vessel, and let go with the greatest ease. Corks or other floats are attached to the upper rim of the iron framework of the buoy by cords of sufficient length to go round a man's body, so as to afford a means of support in the water for several persons at a time. With regard to life rafts, the inventor proposes to fit the skylights, decks, seats, bridges, or roofs of deck-houses of passenger ships with air-tight compartments somewhat similar to the life-preserving apparatus, and by a simple arrangement of chains and spring hooks to connect them together, and thus form one enormous and safe raft. Each compartment may have a quantity of fresh water always available, and if fitted with the telescopic masts will have signal fires to use at night, and the signal flags, which, when the raft is afloat, will rise to a considerable height above the sea. The skylight seats may be constructed with pointed ends, so as to enable them to be propelled through the water by means of oars or temporary sails attached to the telescopic masts.

THE UNITY OF IRELAND SECURED BY CUTTING THE ISLAND IN TWO.

THE greatest social reformers are the Engineering and Constructive Arts. A project is under consideration, which for its simplicity, and the great social benefit it would confer on this country as well as on England and America, deserves encouragement, which we have no doubt it will receive. We refer to the projected formation of a canal from Galway to Dublin. The proposed canal is designed to accommodate vessels of large tonnage, and Atlantic steamships. They would be towed by steam-tugs between the ports of Dublin and Galway. It is reasonable to anticipate that in time a great portion of the traffic between England and America would flow through this channel. There are comparatively few difficulties to contend against. The distance is about 120 miles. After the ideas of bridges across the Channel, tunnels underneath, and midway suspended tubes, &c., it is a positive relief to get hold of something tangible, simple, and practicable. It is an amusing and, at the same time, sad phenomenon to witness the way in which capital is sometimes inconsiderately embarked and squandered in wild speculations, in which—although great obstacles are overcome by engineering science and skill—so much substance is swallowed up in the undertaking, in proportion to the advantages conferred by the attainment of the object, that the thing becomes ever afterwards a splendidly expensive luxury to the few, and an anxiety to the shareholders.

In the project before us there is none of this element. We question very much whether it needs any arguments in its favor either in its engineering or financial aspect. Let any one take up the map of Ireland and trace the course of the proposed canal, and see how few are the obstacles in its course. South of the railway from Dublin to Galway its course would be—Galway, Oranmore, Athenry, Kilconnel, Ballinasloe, Athlone, Lough Ennel, Clonard, Kilcock, Maynooth, Dublin, Kingstown. It would be difficult to conceive a project in which engineering science and capital could be used to greater advantage. Scientifically, economically, politically, commercially, and socially everything is in its favour. Talk of the union of the rose, shamrock, and the thistle: here would be the union of a trio of nations such as the world has never seen. England, Ireland, and America would be one. As far as the governments and the people are concerned, it is indeed a "consummation devoutly to be wished." The President of the Board of Trade has, in a recent debate, expressed his sense of the comparatively small value of "mere parchment unions." We urge those hon. members, who may be supposed to be interested in this scheme, to elicit the views of the honorable president of this important department on this subject. It deserves hearty support; indeed we predict success to the project.

MID-CHANNEL TELEGRAPHS.*

THE title with which we have headed this article may at first sight appear strange, and the following observations will probably be passed over by several of our readers with a shrug of the shoulders and an inward thought of "What next, I wonder?" The proposed scheme of establishing mid-Channel telegraphs is, however, no chimerical suggestion, although it would seem to imply that the general mistrust of the public in engineering operations on shore has driven certain members of the profession to try their luck at sea. So far as the present project is concerned we wish them every success, being fully convinced of the great and general advantages which a fair development of such an undertaking must confer upon mankind, socially as well as commercially.

It is impossible fully to realise, in anticipation, to what an extent the establishment of floating mid-Channel telegraph stations would assist in the advancement of our com-

merce and the development of our commercial relations with other countries. There can, however, be no doubt that by this means a serious want, and one which has been long felt, will be, in some measure at least, supplied. It is, of course, impossible to place those at sea in a position to communicate at pleasure with home, but that is no reason why such means of communication should not be pushed out some fifty or sixty miles in advance of the boundaries of our coast. Nowhere would such out-stations be of more service than in the English and Irish Channels, upon which a constant interchange of commerce is being carried on between all nations. Taking the Scilly Isles as a post of observation, from thence may hourly be seen the flags of all nations, passing to and fro between the British and other northern parts of Europe and the rest of the world; and it is in the vicinity of these islands that not only the greatest delays to commerce are experienced, but also the most imminent dangers to navigation, which is forcibly illustrated by the following facts:—

Thousands of vessels call every year at Cork, Falmouth, and the other southern ports for orders. They are, as is well known, often delayed for days, and even weeks, by foul or baffling winds, before they can make those ports of call. Very frequently also, when their orders are at last received, they have to put back and make for other ports, which they might have reached with ease, in the first instance, from the chops of the Channel, could they then and there have obtained the requisite instructions. Several prominent evils arise from this cause of delay, such as loss from fluctuation of markets, wear and tear of material, extra time of voyage, cost of wages, extra consumption of sea stock, risk to, and often increase of, insurance, and not unfrequently shipwreck, attended with loss of life.

Numerous vessels bound direct are annually delayed, crippled, or lost in the same vicinity for want of coals, cordage, lights, provisions, stores, or towage assistance, more or less to the loss of the owners, merchants, and underwriters. Derelicts with rich cargoes may frequently be seen after a gale washed about at the mercy of the winds and sea, till sunk or dashed to pieces on the rocks. Passengers having pressing business are, at present, unable to land at the nearest port. Owners, underwriters, and others, are ignorant of the important fact that the vessels in which they are interested have either made the English coast *inwards*, or cleared its dangers *outwards*, until their arrival, or unless reported by some passing vessel or pilot-boat.

To meet these requirements it is proposed to establish, in the fair way of shipping, floating telegraph and store vessels. It is proposed, first of all, to moor a floating telegraph and store vessel in the chops of the Channel, between Scilly and Ushant, to be followed by others at the southern entrance of the St. George's Channel, off the southern and northern coasts of Ireland, and eventually in other spots, as necessity may arise—submarine telegraph cables to be laid communicating between the said vessels and the points of land nearest to them, and thence with the whole telegraphic network of the United Kingdom and the world; powerful steamers for the conveyance of mails, passengers, &c., to be fitted and supplied with the necessary means and appliances for towage, salvage, and telegraph cable repairs; and store depôts made on shore, with which to furnish such vessels as may require them with stores of all kinds. It is proposed that the telegraph floating vessels should be built of wood, in watertight compartments, of about 200 tons burden, and fitted with two masts. The moorings are to consist of a mushroom anchor, of about 45 cwt., with about 100 fathoms of the patent proved short-linked 1½-in. iron chain, bent on to about 250 fathoms of 14-in. "coir" cable, the latter being for veering out in heavy weather, on account of its light specific gravity and great tensile strength. This combination would relieve the downward drag upon the ship's bows, which an iron chain of the size requisite would entail. The

steamers are to be built of iron, of about 500 tons, and propelled by paddles, having two engines of 110-horse power each, and boilers of 4-in. plate.

Any objections which might at first sight appear to the proposal for mooring the floating telegraph stations in the situations suggested, will be dissipated by reference to the report of the royal commission on lights, buoys, and beacons of 1861, which clearly proves that there is no difficulty in mooring vessels safely in the positions indicated above, nor any danger to be apprehended from their being so moored. In that report it is stated, "The evidence which the commissioners have obtained from the masters of light-vessels goes to prove that the most exposed situations are not necessarily the most dangerous or disagreeable." Again, "The masters of the Seven Stones, and the Conigbeg light-vessels, agreed in saying that the long sea and great length of chain required to anchor in deep water, made their stations, which are the most exposed in the kingdom, easier to ride in than stations where the sea is shorter, the water shallower, and the current stronger, &c." Other passages might also be quoted, all tending to prove the same thing. From statistics which have been collected for the purpose, it appears that there are nearly 39,000 vessels belonging to the United Kingdom and the colonies, represented by an equal number of *managing* owners. On the average of the last few years about 6,500 vessels annually put into Cork and Falmouth for orders and refuge; and no less than 14,950 vessels, on an average, annually arrive in the port of Liverpool. When to this is added the large number which put into the other southern ports for orders and refuge, some idea may be arrived at of the immense utility of such telegraph stations as it is now proposed to establish.

The proposition has been referred for opinion to Lloyd's, the Admiralty, and other influential boards, from all of whom we learn that the promoter, Captain Knapp Barrow, has received the warmest expressions of encouragement. The engineering part of the proposed works will be entrusted to Sir S. Canning, Mr. Latimer Clark, and Mr. Robert Sabine, conjointly.

THE ROYAL DUBLIN SOCIETY.

ON the 1st inst. a meeting of the above Society was held in the Board-room, Kildare-street, Phineas Riall, Esq., J.P., in the chair. An application from Mr. John Bower, C.E., on the part of landowners interested in the river Barrow drainage, for the use of the Society's theatre for a meeting on the 15th inst. was read, and the request complied with.

The following were declared duly elected as the standing committees of the various departments for the ensuing year:—

Practical Science.—Simon Foot, J.P.; William Barker, M.D.; Gilbert Sanders, James Sayers, M.D.; Wm. Andrews, John Rigby, Rev. J. A. Galbraith, F.T.C.D.; Edwd. Dillon Mapother, M.D.; Robert S. Ball, A.M.; G. J. Stoney, A.M., F.R.S.; Howard Grubb, C.E.

Botany and Botanic Garden.—Simon Foot, J.P.; John Lentaigne, M.B.; John R. D'Olier, John Toler, M.B.; Wm. Thornhill, M.B.; Amos Vereker, Benjamin G. Darley, M.B.; Samuel F. Adair, John Eustace, M.D.; D. Toler Maunsell, M.B.; Hermann R. De Ricci, M.D.

Fine Arts and Manufactures.—William McKay, LL.D.; Judge Kelly, LL.D.; Edward Wight Seymour, Frederick Darley, C.E.; Francis R. Davies, Evory Kennedy, M.D.; Robert J. T. Macrory, A.M.; J. Robinson Kirk, R.H.A.; Thos. Newenham Deane, R.H.A.; Viscount Powerscourt, Lieutenant-Colonel Adamson.

Natural History and Natural History Museum.—Robert Callwell, Philip Bevan, M.D.; John Barker, M.D.; John G. Rathborne, J.P.; Thomas Edward Beatty, M.D.; Wm. Andrews, George Ellis, M.B.; Dominick McCausland, LL.D., Q.C.; John Good, Samuel Gordon, M.D.; A. Wynne Foot, M.D.

Library.—Charles Kelly, Q.C.; John R. Garstin, LL.B.; Frederick J. Sidney, LL.D.; Wm. Archer, Robert Griffin, Edwd. Perceval Wright, M.D.; H. Dix Hutton, J. Kells Ingram, LL.D., F.T.C.D.; Rev. B. Dickson, D.D., F.T.C.D.; John T. Gilbert, Robert S. Ball, A.M.

* From the Engineer.

THE SEWAGE DIFFICULTY.

A CORRESPONDENT of the *Engineer* thinks the following useful particulars for local boards may be found to possess some value:—

Scientific.—The speed of water in pipes varies as the square root of the head, or height from which it falls. The pressure of the atmosphere is 14½ lb. avoirdupois on the square inch. The pressure of water at rest is, at a depth of 34ft., equal to that of the atmosphere; the pressure of air and water together at this depth is nearly 30 lb. per square inch. The pressure of water at rest on any surface is proportionate to its depth and to the area of the surface. Water dissolves various salts in various proportions, according to its pressure and temperature. These salts contain potassa, soda, lime, and magnesia, all of which are useful to vegetation. Water dissolves many other substances, and particularly metallic oxides; these are mostly injurious to vegetation. Vegetable matter is chiefly composed of oxygen, hydrogen, nitrogen, and carbon, with very small proportions of phosphorus, sulphur, &c. The fertilising elements in sewage consist chiefly of phosphorus and nitrogen; the latter occurs sometimes in the form of nitric acid, but more usually in that of ammonia or sal volatile. Plants contain from 70 per cent. to 90 per cent. of water, which is composed of oxygen and hydrogen gases.

Disinfecting.—It is very difficult to disinfect sewage or any other manure without damage to some of its fertilising elements. Lime is a very good disinfectant, but it destroys the fertilising properties of sewage, displacing the whole of the ammonia. Earth does not completely disinfect sewage, but vegetation does this by decomposing its elements, and taking them up in various proportions according to the nature of the plants, soil, atmosphere, and climate.

Utilising.—Grass is the best crop for the immediate application of sewage, but this manure is very useful for other crops, and a proper rotation should be observed, so as to utilize all the elements of the sewage. The best soil for utilizing liquid sewage is a barren and porous soil. Sewage irrigation has been tried on a large scale, and with very good results, at Edinburgh, Birmingham, Croydon, and Barking. Sewage water should not be allowed to stagnate in meadows, nor, indeed, in any other place.

Removal.—Gravitation is not always the cheapest way of removing sewage. Very few towns are so placed that their sewage can be removed by gravitation; but pumping is not expensive for ordinary heights. The cost of pumping water from a low to a high level is proportionate to the height. Water offers the best and cheapest means of removing the filth in drains, or any solid. (In the Mexican mines large excavations are made very rapidly by bringing water into them, and allowing it to wash away the loose rocks.)

Engineering and Surveying.—All districts to be drained or irrigated should be carefully surveyed before any new works are commenced. The plans of such districts should show all the old sewers, with the levels of interesting points; the level of the surface should be marked in black figures, and that of the drain or sewer in blue. All lands to be irrigated should be "contoured." The cost of surveying and levelling varies considerably; parish surveys, without levelling, are frequently paid at the rate of 2s. to 2s. 6d. per acre, but the prices may range between 1s. and 5s., and even more. Town surveys are usually more expensive than those of the open country; on the contrary, the cost of levelling towns is usually less than that of levelling fields, especially in rugged countries. No accurate level can be taken but with the spirit level. Engineers consulted on new sewage works should be supplied with complete plans of site and all other particulars, especially—Population, area of site, number of houses, newest and oldest drains, dimensions of principal existing drains, greatest

fall of ditto, smallest fall of ditto, quantity of water supplied, particulars of manufactures in the locality. Surveys should not be done in a hurry. To survey and level a town of the importance of Birmingham (about 300,000 inhabitants) would occupy a very good staff of surveyors during three months at least. Local boards should cause periodical surveys to be made at intervals of three, four, or five years. Engineers' projects, i.e., drawings, specifications, and estimates, to be carefully prepared, require about as much time as the surveys. Drains and sewers should have a fall of at least 1 in 2,000. They should be set out as nearly as possible with a uniform incline or fall; the upper portions of the drains should not be steeper than the lower, otherwise the outfall will be choked. All drains and sewers should be as easy of access as possible; so should all water and gas pipes, valves, traps, sinks, and gulleys, so that leaks may be repaired conveniently, and pollution be avoided. All drains or sewers should be absolutely impervious. For moderate falls, that is to say, in flat districts, the egg section is the best; when the declivity is considerable, the barrel-drain may be used. A very good drain may be made of concrete, or more properly speaking, beton, the invert, or bottom, being made of glazed earthenware blocks. The beton should be made of hydraulic lime or cement and sharp sand—no shingle—in proportions to be determined by the engineer.

CHURCH OF ST. BARNABAS,
NORTH LOTTS.

WE give with our present number an illustration of the new Church and School-house of St. Barnabas, North Lotts. The school-house has been for some months completed, and in use; the church will not be finished until next month. The material used is limestone, with dressings of Bath stone. The designs were by Mr. A. G. Jones, of Molesworth-street; the contractors, Messrs. Gahan and Son. The entire cost will be about £5,000.

NOTES AND CIPHERS.*

THE other day, for want of something better to do, or for the reason why a well-known young man in the poem "whistled as he went," namely, "for want of thought," we looked over a couple of hundred ordinary replies to an ordinary invitation, "So-and-so solicits the honour of So-and-so's company," and So-and-so will be happy to come," or he won't be, according to circumstances, or she won't be, according to gender. Lazily turning over the glossy sheets, and almost sent into dreamland by the constantly recurring formula, two things struck us, and one of these things was this thing,—that amongst the respondents there were forty educated men and women who said, "we will have the pleasure of accepting the polite invitation." Speaking from knowledge of those who thus write, one would say there surely must be some way of defending this mode of expression (a parson, a painter, a poet, a peer, and a parliament-man are amongst those who use it; and it is even printed on cards and sheets of paper in blank, to save the time of the overwhelmed, and sought for); but, for the life of us, we cannot find it. They do accept, they are accepting; invitation is the present act of inviting, and that present act they accept; they do not intend to do it to-morrow, they do it when they write. Quite properly they "will avail themselves of" an invite, "will have the pleasure of coming," or "will accept your hospitality;" but as to the invitation, they do then and there accept it; there is no "will" in the case: so, to misapply Longfellow's line,—

"Trust no future, however pleasant,"

The other thought that forced itself upon us was one adverse to the present universal adoption, even by those who have historic

crests, of what are called Monograms, but which are for the most part nothing more than idiotic and contorted groups of letters, often illegible, and oftener still wholly unsuggestive of the information intended to be conveyed. What is really a monogram? A *monothest* believes in one God; a *monologue* is a speech uttered by one person; a *monodram* is a dramatic performance by one actor only; a *monosyllable* is one syllable; and a *monogram* is one letter or a character done at one writing; that is, with a continuous line, though compounded of several letters—*monos*, one, and *gramma*, a letter. One might as well call three or four stones leaning against each other a *monolith* (*monos*, one, and *lithos*, a stone), as three or four distinct letters, because gloriously jumbled, a monogram. Still, what's in a name? A nose by any other name would smell as well; so pass by the name and look at the thing itself. The great majority of these ciphers are altogether unintelligible. There is a proper system which, if followed, would make them always understandable, at any rate, by those who know the system. But in practice, as a rule, there is no rule, and confusion worse confounded results. Thus, on pious Mary Anne Dickon's envelope we get three letters, very blue (suggestive of "deep read"), lovingly entwined, but whether they are meant to suggest M. A. D., or say D. A. M., is no more easily to be divined without extraneous knowledge than you can understand from the so-called monogram of our wild friend Trimmer, christened Richard Andrew, whether he means it to convey R. A. T. or T. A. R. An astute doctor of our acquaintance, a strict monogamist, has twisted his R. and his T. and his D. about till they resemble nothing so much as the cipher of the Grand Turk; and one of the most refined and dignified of ladies, high in the social scale, assures every one at the top of her notes, and in violent tones (of colour), that she is L. O. W. However, this is but a fashion, and we have the comfort, if it be one, of believing that long before people have left off saying they *will* have the pleasure of accepting what by that saying they *do* accept, they will return to their proper crest if they have one, and make their cipher intelligible if they have not.

THE ROYAL INSTITUTE OF THE
ARCHITECTS OF IRELAND.

An ordinary general meeting will be on this evening at eight o'clock.

Paper by William Gray, Associate, Belfast—"The Building Stones, &c., of Belfast and the Counties adjoining."

Recommendations papers to be read:—As Associate—Francis Nolan, Student, 60 Upper Sackville-street, Dublin. As Student—Wm. O'Brien Newell, A.B. and C.E., T.C.D.

To be submitted for ballot:—As Honorary Fellow—Abraham Denny, Fellow, Waterford. As Associate—Henry William Thompson, Hazlebrook, White-abbey, Belfast.

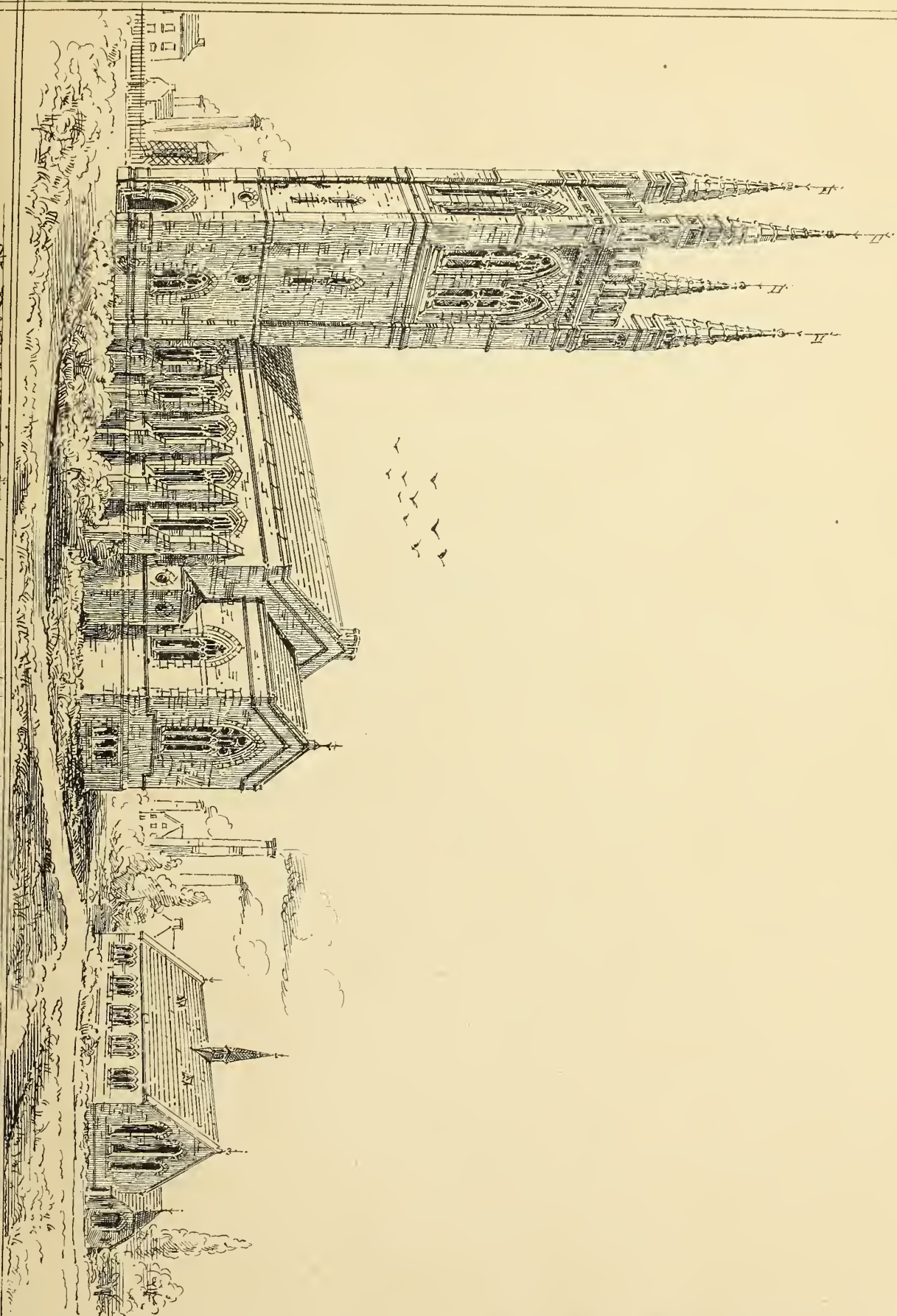
The Council solicit a subscription of 2s. 6d. from each member (to be sent in postage stamps to the Treasurer, Sandham Symes, Esq., 58 Lower Dominick-street, Dublin), to enable them to give a prize in money with the "Fitzgerald Bronze Medal," in accordance with the following resolution passed at last meeting:—

"The council offer a prize for the best contribution of sketches or notes of the present state or past history of ancient monuments, buildings, furniture, or antiquities in the neighbourhood of Dublin, or any other locality in Ireland."

"The council desire to encourage the study and record of such buildings, &c., as, from their comparatively unknown locality, and generally conceived unimportance, are nevertheless valuable as bearing on and illustrating the history of ancient architecture, and the practice of ancient building, ornament, and construction."

"A map of the county of Dublin will be exhibited at the Institute Rooms, on which will be marked by members the locality of any known monument. Such notes or drawings to be forwarded to the Hon. Secretary of the Institute before the 1st of January, 1870."

ST. BARNABAS CHURCH AND SCHOOLS N. LOTTS



THE LIBRARY
OF THE
UNIVERSITY OF ILLINOIS

BRONZE STATUARY.

Among the various branches of fine art metal work, the casting of bronze statuary, a *chef-d'œuvre* of Messrs. Elkington's world-famed establishment, possess perhaps as many points of interest as any. A leading process of bronze casting is known as the *cire perdue*, or wax process. A structure of iron bars forming the skeleton of the statue sustains the core. This rough angular outline stands on a kind of platform, having a fire-hole beneath for the purpose of melting the wax when the statue is completed. A mixture of clay, pounded brick, and other material capable of being easily worked when moist, and very solid when dry, is then used for building up the skeleton so as to present the general contour of the figure, but less than the proposed statue by just the thickness of the metal to be employed. Over all this is placed an equal layer of wax, on which all the details are expressed by the sculptor. "When," says Mr. Aitkin, our informant, "the work is satisfactory from every point of view, ascending rods of wax representing channels by which air is to find exit on the metal entering the moulds are placed wherever required. Viewed in this state, the model and its accompaniments strongly suggest the venous and arterial system of the human body, as shown in anatomical works, with the difference that the wax rods are external to the model of the body, which is visible through the intervening meshwork. The whole model and rods are then painted over with fine loam in a liquid state, the process being repeated until the crust is strong enough to sustain a thick loam plaster. It is then bound with iron hoops, and a fire is lighted beneath the platform. The outer coating of wax, exactly representing the metal to be cast, is melted out, and the mould is intensely heated until dry enough to receive the molten metal from a reverberatory furnace adjacent to the mould. Jets are made for the introduction of the metal, and the apertures left by the melting of the wax rods afford a ready mode of exit for the air. The plug of the furnace is withdrawn, the flowing metal fills the mould, and the statue is completed. This process is somewhat hazardous, seeing that any defect in the casting would completely destroy the long labour of the artist.

Another method of moulding bronze figures, more generally practised, is to model the object in plaster, and a piece-mould of Caen sand $1\frac{1}{2}$ in. to 2 in. thick made round it. The size of these pieces is determined by the shape and character of the portions they copy. These pieces are backed with plaster of Paris, with indentations cut in their horizontal thickness, into which the succeeding parts of the mould are fitted. The mould is then taken to pieces, dried, and rebuilt in the casting pit. Core composition in a liquid state is poured in, and this having hardened, the mould is once more dissected. The core thus obtained is well dried and reduced in size equal to the proposed thickness of the metal. The mould is then built up over the core, and the pit filled as in the *cire perdue* process. The statue is completed after its removal from the mould by cutting off the jets and chasing all the details of outline into perfect shape.

Strangely enough, the composition of bronze differs only slightly from that of the oldest examples. Occasionally to the copper and tin is added a small proportion of lead. But if the material as at first compounded was incapable of much improvement, great strides have been made in the artistic excellence of bronze work during the present century. Five great monuments of Elkington's fame for bronze casting are the following statues: Sir Robert Peel (Mr. P. Hollins, modeller), in Birmingham; General Frère, sent to South America; the Guard's Memorial (John Bell, modeller), in Pall Mall, London; Thorneycroft's model of the late Prince Consort (distributed to Liverpool, Halifax, and Wolverhampton); and Foley's equestrian statue of Lord Hardinge. Of the latter Mr. Aitken says:—"Around it in the square of Calcutta where it stands the Arab horse-dealers gather

at sundown, and, comparing the steed with their own desert-born barbs, pronounce it no work of human hands, but those of the wonder-working genii; while the natives, gazing up in reverence, whisper of the doings of the 'Great Sahib.'"—*Engineer*.

IRISH DOCKYARDS AND SHIP-BUILDING.

WE print below a summary of what occurred in the House of Commons a few evenings since in Committee of Supply on the vote of £767,070 for steam machinery and vessels built by contract:—

Mr. Graves said that, having himself had ships built in Dublin, he thought it a fair question to ask how it was that the Government had no ship-building done in Ireland. Ships could be built in that country quite as well as anywhere in England. It was the fashion to talk about an Irish policy, but here was a way in which material benefit might be rendered to Ireland; and he would venture to throw out the suggestion that the First Lord of the Admiralty should, whilst distributing his favours, direct that some ships should be built in Irish dockyards. There had already been practical experience of the capacity of Belfast to build ships, and there was not a port in England that could turn out better work. The same might be said for Cork, where a great dock was now in course of construction; and he would say that he hoped, as an Irishman himself, and as a person of practical experience in ship-building in Ireland, the Government would not forget that there was every proper facility in that country for building Government ships.

Admiral Seymour corroborated all that Mr. Graves had stated. With reference to Belfast, he might mention that the late Government had built a gunboat there, and the Comptroller of the Navy had told him that it was impossible to turn out better work than that which had been done in Belfast.

Mr. Childers assured the House that the suggestion to build ships in Belfast should receive the attention it deserved. He was not surprised that the gallant admiral who spoke last should have advocated the claims of Belfast, as he was an Irishman, and connected with that portion of the country. It was, he thought, unfortunate that there was no *Irishman on the present Board of Admiralty*, but the circumstance should not be allowed to act in a manner injurious to the interests of Ireland, should a favourable opportunity occur of building gunboats at either Belfast or Cork.

Mr. Dodson then put the question that £746,816 be granted to her Majesty for new works, buildings, machinery, and repairs.

Mr. Maguire said, before the vote was taken, he desired to draw the attention of the Government and of the House to the state of things at Cork. Some years ago a Select Committee of the House approved of the recommendation that a dry dock on a large scale should be built at Cork Harbour. The construction of the dock was commenced four years ago, and the First Lord of the Admiralty of that day stated that it would take six years to complete. The fact was, however, that the dock might, at this moment, be said to be as far from completion as ever. Some stones had been quarried, and some piles had been driven, but, owing to the absence of any adequate supervision, little sensible progress had been made. Colonel Clark, an eminent engineer, had charge of the work, but rarely gave it the benefit of his supervision; and the only person employed to look after it was a man, certainly very respectable, but who could not be said to fill any other position than that of clerk of the works. About 100 yards of the cofferdam had been constructed, but so imperfect was the piling that the sea broke in and carried away the little that had been done. He knew he might be told that the work, when originally proposed, was to be executed by convict labour, but that he denied; in fact there was no adequate labour of the kind available for the purpose. The total number of convicts in the neighbourhood was only 500, and the Government ought to have fallen back upon free labour. Instead of doing so, however, they had only 150 men at work, of whom only thirty were mechanics. The feeling at Cork and Queenstown was that at the present rate of progress fifty years would be required to complete the work. The sum voted by Parliament for the construction of the dock was £150,000, and up to the present time not more than £38,000 had been expended.

Mr. Trevelyan (Civil Lord of the Admiralty) said that the understanding, four years ago, when the project was sanctioned by Parliament, was that the work should be done by convict labour only. Eighty convicts had been employed on the works during the first eighteen months or two years; but much more rapid progress was now being made, and at the present month there were 589 convicts and 189 free

labourers employed on the works, while the expenditure for the last twelve months alone had been £34,000.

Mr. Maguire denied that the original intention was to have the docks constructed by convict labour.

Mr. Trevelyan certainly understood that convicts were to construct the dock.

Mr. Childers said that the first vote was taken on the understanding that convict labour was to be solely employed. The Government would now carry on the work as it had been carried on last year, through the medium of free as well as convict labour.

THE SPRING SHOW AT THE ROYAL DUBLIN SOCIETY.

THE spacious premises and grounds in Kildare-street have been well and profitably utilized this week by an exhibition of breeding and fat stock, sheep, swine, poultry, and agricultural implements. The arrangements made by the special committee of the society were characterised by efficiency and completeness. The Agricultural Hall contained the cattle, arranged in classes, in stalls. The galleries were devoted solely to the display of poultry. The implements required a large ground space, and fully occupied the court-yards, as well as the greater portion of the Shelbourne Hall. The show of implements was generally acknowledged to be the best yet held in connexion with the Royal Dublin Society, and we need hardly say that it attracted crowds of visitors. We shall name a few of the exhibitors, and the articles shown by them.

Messrs. Kennan and Sons, Fishamble-street, have an immense stand, at which are exhibited their recently-patented improvements in lawn mowing machines, which have been so simplified that the most inexperienced can use them. The patent hydraulic apparatus is a new and highly important invention for facilitating the use of water in towns and gardens, &c., under high pressure. It consists of a light iron drum, mounted on wheels; the hose pipe is wound on the drum, and has one end attached to the pump or stand pipe, while the other end is connected to the jet on the machine; as the drum carriage is wheeled about, the hose uncoils and coils again by self-acting gear, without stopping the flow of water or dragging the hose on the gravel or roadway. Messrs. McKenzie, Dawson-street, also have a large stand, at which a number of most useful implements are exhibited. Considerable interest was excited by Norton's tube wells and pump—the same as used during the Abyssinian expedition with such satisfactory results—which is so well adapted for country districts where the ordinary means of obtaining water are costly, and often inefficacious. By this system a well can be sunk in from half an-hour to three hours. Messrs. Edmundson and Co., Capel-street, exhibit Moule's Patent Earth Closets; also Hugon's Patent Gas Engine, without electricity, boiler, or chimney. The motive power is derived from common gas, and the engine can be started in one minute by the application of a match. It can be placed on a wooden floor with perfect safety, as no furnace is required, and is adapted for pumping water or driving machinery. Messrs. Maguire, of Dawson-street, exhibit a model of Sackville-street, showing the proposed improvements to Carlisle Bridge, designed by Mr. Charles Geoghegan; patent apparatus for preventing water pipes bursting, also by Mr. Geoghegan. Mr. Henry Duffield shows a most interesting collection of carved wooden prints, representing crests, birds, flowers, &c., for pastry and butter, inlaid ornaments for ladies' work tables, &c. Messrs. Dickson and Son show a fine collection of agricultural seeds, garden esculent seeds, horticultural implements, conifers and other plants, dried flowers, &c. Messrs. Smith and Wellstood, have a model stove at work. Messrs. Walter Carson and Sons, manufacturers of anti-corrosion paints, &c., have their stand on the left side of the principal entrance gate; they show specimens of their paints in the several varieties of tints made by their firm; these paints are well known to be admirably adapted for all kinds of outdoor work. The show was honoured on Tuesday by a visit from H.R.H. Prince Arthur.

THE SINAI ROCK INSCRIPTIONS.*

AFTER four months' careful study of the Sinaitic Inscriptions, I have at last solved the difficulty of their interpretation. Although the palæographic details must necessarily be reserved for a more extended report, a slight sketch of the method employed in deciphering them, and the results at which I have arrived, may not prove altogether uninteresting to you. My first impression on seeing the inscriptions was, that the chief difficulty had arisen from the inaccuracy of former copies, and I was convinced that some practice and considerable familiarity with the writings were requisite before a faithful reproduction could be hoped for. I accordingly proceeded to make careful drawings of all that were accessible in our immediate neighbourhood, and spent as much time as possible in studying them daily upon the rocks themselves. Wishing also to form an independent opinion, I carefully avoided consulting any of the alphabets which had been constructed by previous essayists, until I should myself arrive at some conclusion, or find some internal evidence to afford a clue to the mystery. The result of my investigations was a conviction that the Sinaitic inscriptions, so far from being in a unique and unknown character, were in reality nothing but another phase of that Semitic alphabet whose forms appear alike in the Hebrew, Arabic and Greek. They seemed, indeed, to constitute an intermediate link between the ordinary Hebrew and the Cufic, and this relationship was shown still more clearly by a comparison of the two classes into which the Sinaitic writings principally resolve themselves. In some cases the letters are detached, and bear a strong resemblance to the Hebrew; in others they are connected by a line, and their forms being more cursive, might be mistaken by an unpractised observer for Cufic. As I acquired greater familiarity with them, the identity of individual letters almost forced itself upon me; but I still refrained from attempting any transliteration which rested upon such speculation alone, and determined to wait until I had seen the larger collection in Wady Mukatteb before putting my conjectures to the test. I noticed, moreover, that Greek inscriptions were of frequent occurrence amongst the Sinaitic, and if external indications could be trusted, coincident with them in date; and I entertained great hopes that I might meet with others in Wady Mnkatteb to confirm my views; especially as at least one bilingual inscription was reported to exist in that place. Nor were my expectations frustrated by the result. On the 26th January Mr. Holland and I started for Mukatteb, with the intention of copying, if possible, the whole of the collection there. We had even then copied a large number in other parts of the Peninsula, my book alone containing over eight hundred of them.

Our first visit was to the alleged *bilingual* inscription, and I found that the evidence of the Greek and Sinaitic writing of which it consists having been executed by the same hand was even more incontrovertible than it had been described. I remarked, at the same time, that the copies hitherto brought to Europe were so inaccurate as to convey but a very faint idea of the real appearance of the stone. This inscription not only confirmed my previous views as to the co-existence of the Greek and Sinaitic, but established the correctness of my identification of the various letters occurring in it. Still, adhering to my former resolution, I made no theoretical deductions, and regarded the identification of these very letters as dependent upon the discovery of additional proofs. These I shortly obtained, and in such numbers as to form an overwhelming weight of testimony to the accuracy of my deductions. I have now copied no less than twelve inscriptions in which the Greek and Sinaitic occur together, undoubtedly by the same hand, and I have been enabled, by their means, not to construct an alphabet, but to demonstrate the value of every letter of the Sinaitic.

I have been thus far peculiar in describing the method by which the results I am now about to communicate have been attained, as I am sure that in a question upon which so many conflicting opinions have been formed, I shall otherwise hardly escape the imputation of theorizing or partisanship.

The inscriptions consist of detached sentences, in a Sinaitic or rather Aramæan dialect, for the most part proper names with such introductory formulae as Oriental peoples have been from time immemorial accustomed to prefix to their compositions. Thus far they accord with the account given by Cosmas Indicopleustes; and I see no reason why, without arguing for a too remote origin, his Jewish fellow-travellers should not have been able to read, as he asserts they did, inscriptions in a language and character so cognate to their own. The alphabet of the Sinaitic inscriptions agrees in part with that constructed by the late Prof. Beer, whose work I have since consulted, and who seems to have recognized the existence of the bilingual inscription to which I first alluded. I have no doubt that had that eminent scholar possessed opportunities of studying the writings *in situ*, or at least of obtaining accurate transcripts, he would have succeeded in a correct rendering of the whole; as it is, his alphabet is but partially correct, only so far as he was furnished with accurate data on which to proceed. To his theory concerning the authorship of the inscriptions I cannot give so full assent. That they are the production of a Semitic, or rather Aramæan, people is true, but that they are the work of Nabattæan pilgrims is an assertion that rests on conjecture alone. They are the work, not of pilgrims, but rather of a commercial community who inhabited, or at least colonized, the Peninsula for the first few centuries of the Christian era. That many of the writers were Christian is proved by the numerous Christian signs they used, but it is equally clear from internal evidence that a large proportion of them were pagans. The writing must have extended into the monkish times, possibly until the spread of *el Islâm* brought the ancestors of the present inhabitants, Bedawin hordes, from *el Hejaz* and other parts of Arabia proper to the mountains of Sinai, and dispersed, or absorbed, that Saracen population of whom the monks stood in such mortal dread. "Saracen" is necessarily a vague term, but I purposely abstain from a definition which involves historical detail until I can obtain access to historical works of reference; and I will say no more here than that the traces of this former occupation of the Peninsula and the nature and localities of the inscriptions accord so well with the accounts by Arab historians that I feel confident of being able to bring as great a weight of testimony to bear on the authorship of the inscriptions as, I am happy to say, I have already collected in support of my interpretation.

The appearance and numbers of the inscriptions, the instruments with which they were executed, the physical features of Wady Mnkatteb, these are points concerning which travellers have been as much misled as concerning the interpretation, and of which the researches of Mr. Holland and myself enable us to give a satisfactory account. But these and other details I leave until our return. I trust, however, that I have said sufficient to prove that Capt. Wilson was justified in stating in his last report that I had found the key to the Sinaitic Inscriptions.

E. H. PALMER.

Report of Progress to February 27, 1869.

Astronomical Observations.—During a three weeks' tour on reconnaissance, observations for time, latitude, and variation were made at nine different camps; and the results have been worked out up to the present date. These, with the longitudes obtained from the route-sketch and time-bearings, will fix the position of all the important points in the district examined.

Survey.—*Special Survey of Mount Serbál.*—This is now in a forward state. Three-

quarters of the hill-sketching is completed, and two-thirds of it penned in; and the whole will probably be finished by the 10th March, when the camp will be moved up to Jebel Músa and the hill-sketching of that district taken up. The drawing of Corporals Brigly and Mallings is very beautiful and truthful; and the energy with which they have brought to bear on a work, difficult and trying in the extreme, is beyond all praise. Whilst the hill-sketching was in progress, Corporal Goodwin made a very faithful model of Serbál and the ground in front of it, and obtained a large number of sketches from various points, some of which, especially those of the numerous peaks and ravines of Serbál itself, are exceedingly clever.

Two-Inch Survey.—The district at present examined may be described as extending from Wady Feiran and Mukatteb and Seih Sidri on the north to Wady Hebrán on the south, and from the Red Sea on the west to Wady Soláf on the east. It was not possible to sketch the whole of this large district, but the principal features of the ground have been laid down, and all prominent peaks fixed by triangulation and true bearings. One object of the reconnaissance was to examine any practicable routes which might exist from the coast to the mountain-district; and with this view all the large valleys were visited. There are three main routes, one following the course of Wady Feiran throughout, the second passing up Seih Sidri and Wady Mukatteb to join the first at Wady Nisrin, and the third by Wady Hebrán. By the first two roads it would be perfectly easy for a large body of men to advance into the centre of the peninsula. The third is a narrow gorge, and, though it is the usual route followed by pilgrims from Táir to the Convent at Jebel Músa, the ascent to the water-shed is one of the worst roads for loaded camels that has been seen. Notes have been made on the water-supply, vegetation, &c., of the ground passed over, but to enter into any detailed description would exceed the limits of a report. Two days were devoted to an examination of Jebel Nágús and the mysterious noises which arise from it. A number of experiments were made on the sand slope, and several new facts brought to light which will in all probability enable the cause of the noise to be discovered; the noise itself is entirely local and produced by the motion of the sand, and causes a considerable amount of vibration; the note is a deep, swelling one, not unlike that of the *Æolian* harp greatly intensified. A full report of this interesting locality will be made hereafter. Next week a reconnaissance of the country between Wady Ghmrundel and Seih Sidri will be commenced.

Photography.—Serjeant MacDonald has now taken 150 photographs, most of them of Serbál and neighbourhood; they are excellent pictures, and many, especially those from the summit of Serbál, were taken under circumstances of great difficulty; he has also succeeded very well with the Sinaitic inscriptions, and a good series of these have been collected.

Inscriptions.—Mr. Palmer has followed up the clue which he obtained to the deciphering of the Sinaitic inscriptions with the greatest success, and is now able to read those he finds with ease. As he purposes shortly to address a separate report to you on the subject, it is unnecessary here to give any detailed account of the process by which the results have been obtained. Mr. Palmer has copied 1,500 inscriptions in Wady Mnkatteb and at Mughárah, and has collected the Bedawin names and traditions of the district examined during the reconnaissance, forming a mass of information which will be of the greatest value to Biblical scholars.

Archæology.—Mr. Palmer has copied most of the Egyptian tablets at Mughárah, and one of these does not appear to have been previously described: it represents two miners at work, and a third undergoing punishment. The method in which the miners were worked can hardly be described without diagrams; but the tools appear to be of metal, and the

* From the *Athenæum*.

miners prisoners of war; they have long beards, conical caps, and a type of face quite unlike the Egyptian. On a hill near the mines are the ruins of the old settlement, from which an embankment across Wady Ignaiyeh gave easy access to the mines themselves. On the plain of El Gerah there are a number of stone circles; and near the head of the Wady Hebrán are a large number of ancient stone houses and tombs, similar in character to those which have been previously described as existing in the neighbourhood of Jebel Hadid.

Geology.—Notes have been made on the geological character of the country passed through, the junction of the different rocks marked on the sketch, and a number of specimens collected, including a good series of fossils from the greensand formation at Jebel Mukatteb, and the nummulitic limestone near the mouth of Wady Feiran. The turquoise mines at Mughárah have also been examined, and some of the flint implements secured, but the best have already been carried away.

Natural History.—Mr. Wyatt has lately spent a fortnight in the neighbourhood of Túr and on the plain of El Gerah, during which time he has added largely to the collection of birds; he leaves next week for a short stay in Wady Ghurundel.

The health of the Royal Engineers has been very good, notwithstanding the severe mountain work which they have gone through; and they are all animated with the same desire to complete everything in a thoroughly workmanlike manner. They have all given great satisfaction.

(Signed) C. W. WILSON, Capt. R.E.
H. S. PALMER, Capt. R.E.

Col. Sir H. James, R.E., F.R.S., Director General
Ordnance Survey, &c.

PROGRESS OF LIQUID FUEL.

WE (*Engineering*) have watched with considerable interest the various attempts to introduce the use of liquid fuel since the time when the idea as imported from the United States, was first taken up by Mr. Richardson and Captain Selwyn, who were for a time as united as the Siamese twins in their labours to convince the public that a ton of oil was equal to 5 tons of coal as steam fuel. In the early days of great enthusiasm on this subject, when the *Times* predicted a total revolution in steam navigation, and another reconstruction of our navy, as imminent consequences of using liquid fuel; and when Mr. Mallet, in a fit of prophetic inspiration, announced that liquid fuel was to be the fuel of the future, especially for steam navigation, any one who ventured to urge the question whether these anticipations had any sound or satisfactory basis was regarded with pity, if not with contempt, by the noisy advocates of liquid fuel. Five years have now elapsed and we are still without any knowledge of ships being worked with liquid fuel, or of any of those much vaunted advantages having been realised, of which so much was asserted, and so little was done to prove their reality. Meanwhile, we have always done our best to give publicity to experiments and statements relating to this subject, though, at the same time, stating the doubts which obviously suggested themselves when the subject was considered impartially by the aid of sound principles, either scientifically or practically. Within that space of time the asserted superiority of liquid fuel has gradually dwindled down from being fivefold to that of coal, to something less than half as much, while the most satisfactory and trustworthy experiments have not shown the efficacy of liquid fuel to be more than 70 per cent. greater than that of coal, to something less than half as much, while the most recent experiments have given even less favourable results. At the same time the saving of storage space to be gained by substituting liquid fuel for coal, amounted from 35 to 50 per cent. of the space occupied by coal of equal steam producing power, was found to be attainable only at such an increased cost

for the fuel, that its applicability would, on that account alone, be limited to merely exceptional cases. Moreover, the necessity that would exist for providing closed tanks for holding the oil, and the fittings of pipes and cocks requisite for filling them, and for supplying the fuel to the furnaces, would entail considerable outlay, and there would be great risk of leakage that might endanger the safety of the vessel, especially if petroleum or paraffin oil were used. But chief of all the facts connected with the proposed application of liquid fuel in steam navigation, are those relating to the available supply of materials for this purpose. Petroleum, the most abundant of all, is not produced to the extent of 10 per cent. of the probable consumption of coal for steam vessels belonging to this country alone. The manufacture of paraffin oil has been almost entirely extinguished by the low price of petroleum, and could not be expected to furnish material for liquid fuel at less than £5 per ton. "Creosote," or "deal oil," which is, in many respects, the most suitable material known for use as liquid fuel, is not produced to any greater extent than about 100,000 tons a year at most, and though it is now obtainable at about £1 per ton, it is as yet a waste product that the tar distiller has much trouble to get rid of, so that if it came into demand as liquid fuel, its price would probably rise considerably, in proportion to the advantages to be gained by its use, and the slender supply of it that is to be had. Giving full weight, therefore, to all such real advantages as may be gained by the use of liquid fuel in steam navigation, there seems to be the strongest reasons for concluding that its application must, in any case, be very limited, and that it would be desirable only under special circumstances. There may, indeed, be cases where the peculiar advantages of liquid fuel might be of incalculable value, altogether outweighing any considerations as to cost, inconvenience, and perhaps even the danger attending its use, or any other objections; but it seems to be only within such narrow limits that there is any ground for entertaining the question as to its applicability as fuel for steam navigation.

There are some other applications of liquid fuel to which we have referred briefly on previous occasions which seem to have considerable promise of success. It has been used with very great advantage by Messrs. Dorsett and Blyth in heating furnaces of ironworks for bending plates and for forgings. The results thus obtained have been very satisfactory. It has been found possible to produce a higher, steadier, and more even heat with liquid fuel than with coal. Time occupied in heating the plates or forgings amounts to only one-fifth or one-fourth that required with coal. A further advantage of this application of liquid fuel consists in the formation of scale or the superficial oxidation of the iron being very much less than is the case when coal is used. This latter result is probably due to the circumstance, that in the atmosphere of a furnace fired with liquid fuel on Dorsett and Blyth's system, there is little or none of that surplus air always present in an ordinary reverberatory furnace, and for this reason the surface of the iron remains comparatively clean and free from scale during the heating. The saving of time in heating iron with liquid fuel in this way, is referable to the temperature of the fire being much greater than in an ordinary furnace fired with coal in the usual way with a chimney draught. In Dorsett and Blyth's system of using liquid fuel for this purpose, the oil is burnt by means of a blast, and consequently there is reason to believe that the air supply does not amount to more than is actually requisite for the chemical change of combustion. If this be the case, the temperature of the fire will amount to about 4500° Fahr., while that produced with coal burnt, as usual, by a chimney draught, and with twice as much air as is required for combustion, would not be more than 2500° Fahr. Owing to the much greater difference between the temperature of the fire

and that of the iron in the former case than in the latter, the rate of heating would be much more rapid with liquid fuel than with coal.

In using liquid fuel for firing tar stills, it has been found that the more intense heat of the fire does not, as was anticipated, exercise any prejudicial action upon the parts of the still exposed to the flame; but on the contrary, that the stills require repairs much less frequently than when fired with coal burnt by a chimney draught. This result is, no doubt, due to the absence of surplus air in the atmosphere of the furnace; and this fact, illustrative of the beneficial effect of burning fuel with a blast, is well deserving the consideration of all who use steam boilers, stills, &c., for much of the wear and tear of boilers and stills is due to the gradual oxidation of the rivets and plates by the surplus air present in furnaces under ordinary circumstances. The mode of obtaining the blast adopted by Dorsett and Blyth is also highly ingenious. Instead of expending fuel in producing the blast by means of a steam jet, they first convert the oil into vapour, and make the elastic force of that vapour produce the blast or induced supply of air for its combustion. In this way the full efficacy of the oil as fuel is realised, while use of a steam jet producing the blast would involve a waste amounting to at least 10 per cent. of the available efficacy of the fuel.

We understand that experiments are being made at Woolwich Dockyard and elsewhere, to test the working of this application of liquid fuel, and we hope soon to be able to give some account of the results obtained. It has also been adopted for some months at the ironworks of Messrs. Camroux and Co., Deptford, where it has given great satisfaction.

VENTILATING BUILDINGS.

In the transition from dry to rainy weather, there is generally a rise in the temperature of the atmosphere in the change from frost to thaw or rain; this alteration is very considerable. During dry or frosty weather the interior of a building becomes nearly of the same temperature as the atmosphere, and does not alter as quickly when the change in the weather takes place, the warmer air then coming in contact with the interior surfaces of walls and woodwork, deposits thereon the moisture held in suspension, and occasions dampness.

The proper course to pursue under such circumstances is, to open all apertures in the building, except those into which the wind and rain are blowing, and introduce the air freely. By this means the equilibrium of temperature between the exterior and interior will be most quickly restored by the conduction of heat from the air to the interior surfaces, and as soon as the equilibrium is effected, there will be a further tendency to deposit moisture.

From these considerations, persons in charge of buildings should be enjoined to open all apertures on the leeward or sheltered side at ten o'clock in the morning at latest, and keep them open till four in the evening, every day, except those apertures which would interfere with the convenience and use of apartments occupied. Persons not acquainted with the principles on which depend the deposit of moisture and the conduction of heat, will be naturally timorous to open the apertures in rainy weather; but if once shown the rapidity with which the surface of walls and woodwork will dry up, on a morning changing from frost to thaw or rain, by adopting the course here recommended, it will impress them more forcibly with its propriety, than any amount of precepts.

There are other most important reasons in favour of the free introduction of air into buildings that are inhabited; the above considerations have only reference to their preservation from damp—in itself essential to their comfort and healthy use.

Ennis, 2nd April, 1869.

J. H.

OMNIBUSES IN LONDON AND PARIS.

M. LAVOLLEE, administrator of the Omnibus Company of Paris, has published a report concerning the omnibus service in Paris and in London. In the French capital the whole is in the hands of a single company, in the English metropolis there are several companies; and if numbers of passengers be a criterion, omnibuses are much more frequented in Paris than in London. In 1866 there were in London 602 omnibuses, which, in the year, carried 44,351,000 passengers. In Paris, the numbers were—omnibuses, 656; passengers, 107,212,000. In London each omnibus transports 201 passengers each day; in Paris 447, at a lower cost; for notwithstanding the disparity of numbers, the annual receipt was in London 15,337,000 francs, in Paris 20,604,000 francs. The growth of the service in Paris is shown by the 347 omnibuses and 40,000,000 passengers having increased to 448 and 67,000,000 in 1866, and to the numbers above mentioned in 1866. M. Lavollée shows that the Parisian service has many advantages over that of London; that the Parisians are better accommodated than the Londoners; and that the dead weight is less, whereby the force utilized becomes less expensive.

NOTES OF WORKS.

The new church for the United Presbyterian body in Lr. Abbey-street, was opened on the 4th inst. An illustration of the building, as it will appear when completed, was given in the IRISH BUILDER of May 15th, 1868. The cost will be £4,800. Mr. William Fogerty, architect; Messrs. Crowe, builders.

The new offices of the Royal Insurance Company in Dame-street, erected from the designs of Mr. W. G. Murray, have been finished and handed over by the contractor, Mr. John Nolan, of Meredyth-place.

NEW PATENTS.

H. J. TURNBULL, Sunderland, "*Preserving submerged iron structures.*"—In order to prevent the oxidation of the iron it is covered with a composition, consisting of gutta percha and resin dissolved in combination with pine varnish. The surface of the metal is first cleaned and prepared, and the composition is mixed and applied in the following manner. The surface of the iron is, first, to be made clean by the application of muriatic or other acid brought to a proper consistency by the addition of ivory black and pine varnish. This mixture is then applied with a brush, and after being left upon the iron for a few hours, it must be scraped or washed off with water in which a little soda is dissolved. When the surface of the metal thus prepared has become dry, the anti-oxidising composition is applied. The anti-fouling composition, for preventing the adhesion of barnacles and marine vegetation to the surface of iron or other submerged material, is made by dissolving four ounces of phosphorus in sixteen ounces of bisulphuret of carbon and two ounces of absolute vegetable naphtha spirit. Then two pounds of shellac and two ounces of gum benzoin are dissolved in absolute vegetable naphtha spirit, bisulphuret of carbon, or other solvent, to the consistency of thick paint, and the solution of phosphorus is added thereto.

J. H. JOHNSTON, Lincoln's-inn, London, "*Combustion of liquid fuel.*"—This invention consists in burning liquid fuel directly, and without any admixture of steam or water, upon a peculiar grate disposed either vertically at an angle or horizontally. When horizontally disposed the liquid fuel is impelled or caused to flow over the surface of the grate by pressure. It flows in a number of small streams along the face of the several grate bars, which are grooved or channelled longitudinally for that purpose, and having connected to them at their upper ends small liquid fuel supply pipes. These several supply pipes are fed from a regulator above, which receives the liquid through pipes, and a stop-cock in connection with a tank or reservoir situate at a higher level. The air for supporting combustion enters between the grate bars as in the ordinary furnace grates. The furnace chamber may either be composed of fire-clay or surrounded with water spaces, and fire-brick deflecting arches or bridges may be disposed therein as found requisite.

F. DYER, Camden Town, "*Hot-water apparatus.*" This invention consists, first, in the use of the tubular fire-back made of malleable iron or other metal, cast

in one piece from tubes crossed, or cast, or wrought in any other way, or constructed of pipes or tubes of any form or shape, and of any metal. Secondly, in the manner of connecting the tubular fire-brick with the hot-water cylinder. Thirdly, in the application and use of a return pipe with ball valve inserted to prevent the upward flow of water in the return pipe. Fourthly, in the method or mode of connections, by which all parts of a dwelling-house or other building can be supplied with hot water by the use of a hot-water cylinder, reservoir, or tank placed near the kitchen fire and in connection with the tubular fire-back.

MISCELLANEOUS.

PRESERVATION OF MEAT.—It has been long ago demonstrated that the curing or salting of meat is not an efficient preservative against its becoming what is termed "high," or even undergoing partial putrefaction. Meat frequently becomes tainted while in the pickle, and generally during the first steeping. This is obviously due to the fact that the meat is slightly decomposed before the salt or pickle has time to penetrate into the pores, and, so to speak, "leaven the whole lump." If, on the other hand, the meat be cooled down to a low temperature by artificial means without reaching the freezing point, the pores and vessels become contracted and may for remain almost any length of time without absorbing any appreciable quantity of the saline menstruum in which it is immersed. To successfully accomplish the result, it should be maintained in a mollified condition during the whole of the pickling process, and this has been effected by a new process patented by Messrs. Richardson and Watterman, of Boston. The meat while it is yet fresh killed is cut up in the ordinary manner, with the bones undisturbed, and packed loosely in a metallic vessel, which has a lid upon it, and is placed inside another vessel of wood. The annular space between them is filled with a refrigerating mixture of ice and salt. From the interior of the iron vessel the air is extracted. At the same time, owing to the action of the frigorific mixture, the meat becomes thoroughly frozen from the surface to the centre. The effect of the congelation of the water, the serum, and the other liquids in the meat, in accordance with a well-known physical law, is to increase their volume and so distend the vessels containing them. While they are in this condition the meat is withdrawn from the vessel and plunged at once into the saline solution. As a natural consequence, it commences to thaw, and in so doing absorbs the pickle until every portion of it becomes thoroughly saturated with it. The liquids resulting from the melting of the ice occupy less space than the ice itself, and this space is consequently filled with the pickle in which the meat is immersed. For the pickle the following proportions are recommended, but they may vary to a certain amount:—To ten gallons of a saturated solution of salt water add half an ounce of saltpetre, together with an ounce and a half of sugar. After being prepared in this manner the meat is packed in casks in the ordinary way for transport. As an economical advantage, it may be stated that the ice and salt used for the refrigerating menstruum can be subsequently utilised as the pickling solution. The actual and complete freezing of the meat, fish, or other substance acted upon, and its subsequent thaw while in contact with the saline or other antiseptic solution, are the distinguishing characteristics of this new plan of proceeding.

The directors of the Wicklow Copper Mining Company, in their half-yearly report, submitted on last Saturday, state that there has been a steady improvement in the demand for pyrites, but without a corresponding improvement in price. They express the hope that the gradual approach to a healthier tone in the alkali trade, coupled with a coming advance in foreign pyrites, the exhaustion to a great extent of the stock of foreign ore, and the decrease in its importation into the United Kingdom, will improve the position of their company. The total ores raised during the half-year were 21,205 tons, against 21,005 tons for September half of 1868, and the total produce amounts to £14,405, against £13,546, there being an increase of £1,280 from pyrites, and a decrease of £496 in iron ore. On the other side of the account there is no important feature to notice, except an increase in the charge against the mine of £1,080. The net profit is £4,540, against £4,671; and, after providing for the proposed dividend, at the rate of 20 per cent. per annum, or 5s. per share, there will be a surplus of £290 to be added to reserve.

Mr. George Shaw has drawn up a condensed analytical list of letters patent for inventions granted and protections applied for during the year 1868. From this summary of inventive effort we subjoin an indication of the progress discernible in materials and appliances connected with building trades. In all, there were 3,991 applications. Of this large number

11 related to improvements or inventions connected with sewers, drains, and cesspools; 13 with making and sweeping roads; 38 appertained to wheels for railway and other carriages; 4 to docks, breakwaters, and submerged works; 84 to furnaces and consuming fuel; 116 to railways, locomotives, and railway carriages; 185 to steam engines and steam boilers; 33 to artificial fuel, matches, and splints; 6 to baths; 4 to bells and bell-hanging; 2 to castors for furniture; 32 belonging to latches, hinges, and springs for doors; 5 to fenders, fire-irons, and fire-guards; 39 to nails, bolts, screw-nuts, and rivets, and machinery for manufacturing the same; 21 related to the processes of sawing, planing, boring, &c., stone and slate; 54 to sawing, planing, and turning metals, wood, &c.; 72 to telegraphs, signals, and intercommunication in railway trains; 4 to surveying instruments; 14 to drawing, painting, and exhibiting pictures and photographs; 31 to window sashes, shutters, doors and fencing; 3 to floors and flooring machinery; 52 to tunnels, bridges, arches, and portable and other buildings; 21 to lime, brick and other kilns and coke ovens; 10 to artificial stone, plaster, and cements; 30 to bricks, tiles and clay-pipes; 13 to glass manufacture; 19 to blinds, curtains, and shades; 43 to stoves, grates, fire-places, kitchen-ranges, and culinary apparatus; 30 to warming and ventilating buildings; 11 to gas-burners; 33 to gas and water meters and regulators; 43 to cocks, taps, and valves; 31 concerned pipes and tubes for steam, water, and gas, and joints for the same; 21 related to water-closets and urinals; 16 to hydraulic machinery for raising and distributing water; 5 treated of the preservation and preparation of timber; and 2 appertained to coffins, hearses, and preservation of the dead. Satisfactory as this amount of activity thus indicated may be, it appears trifling to that fermenting in men's brains on the other side of the Atlantic.

Extensive lime works, on the Hoffmann principle, are about to be erected close to the Ringsend Basin, on a piece of ground adjoining the Dublin and Kingstown Railway. The great feature in the Hoffmann oven is the saving in the cost of fuel. The combustion being so perfect, there is almost an entire absence of smoke, and no waste in goods turned out. These ovens are extensively used on the Continent, and are rapidly coming into use in England and Scotland, but only two we believe are as yet in actual operation in Ireland, namely, one at Belfast, for bricks, and the other near Comber, county Down, where magnificent lime works have been erected on the estate of Mr. Samuel Murland. The intended oven at Ringsend basin will have twelve chambers, and will be supplied with excellent limestone from a quarry near Celbridge.

ADVERTISING.—Some one asked Lamartine whether he was not spending too much money in advertising his publications. "No," he is reported to have answered, "advertisements are absolutely necessary. Even divine worship needs advertising, otherwise what is the meaning of church bells?"

GOLDSMITHS' WORK.—The progress of fine art manufacture in this branch of trade is strikingly exemplified in a little work published by J. W. Benson, of 25, Old Bond Street, and of the City Steam Factory, 58 and 60, Ludgate Hill. It is enriched and embellished with designs (by Italian, French, and English artists) of Brooches, Bracelets, Earrings, and other articles, suitable for personal wear, or Wedding, Birthday, or other presents, with their prices. Mr. Benson (who holds the appointment to H.R.H. the Prince of Wales) has also published a very interesting pamphlet on the Rise and Progress of Watch and Clock-making. These pamphlets are sent post free for two stamps each, and they cannot be too strongly recommended to those contemplating a purchase, especially to residents in the country or abroad, who are thus enabled to select any article they may require, and have it forwarded with perfect safety.

TENDERS.

The following are the tenders for the restoration of Chester Cathedral. G. Gilbert Scott, R.A., architect. Quantities by Mr. J. S. Lee:—

Barnsley, Birmingham	£24,546
Hughes, Chester	23,571
Holme and Nicholl, Liverpool	22,955
J and W. Bealand, Bradford	22,366
Wood, Worcester	21,633
Thompson, Peterborough (accepted) ..	21,213

The Proprietor of the IRISH BUILDER requests that all parties who have been furnished with accounts from the office will send the amounts of same immediately. P. O. Orders should be made payable to Mr. PETER ROE.

All Communications respecting the IRISH BUILDER, should be addressed to MR. PETER ROE, 42, Mabbot-street, to whom all payments for Subscriptions and Advertisements must be made.

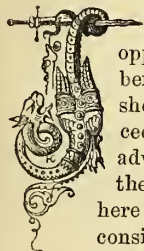
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The Irish Builder.

VOL. XI.—No. 225.

*The Building Stones of Belfast, and the Counties Adjoining.**



AM very glad to have the opportunity of meeting the members of this Institute, if only to shew my interest in their proceedings, and my desire for the advancement of the interests of the Profession. I take my place here to try and discharge what I consider to be the duty of each member—to contribute something to the general information. I may not, it is true, bring before you anything new, or strange, or valuable,—my aim being simply to consider from a geological point of view the available building materials of Belfast, and the counties adjoining.

There is a close connexion between Geology and Architecture; Geology treats of the origin, and Architecture the use of building materials. An architect should be a geologist to understand the nature and origin of his materials for building. The stone, marble, brick, tiles, terra cotta, asphalt, cements, mortar, roofing and other slates, and the metals, iron, copper, lead, and zinc, are all geological productions. The investigation into the origin of these constitutes the science of Geology, while the history of their application constitutes the art-history of the world. Geology is but the physical history of the globe: Architecture is the most impartial record of man's progress in the arts of civilization. And just as we find in the various beds of rock that make up the solid crust of the globe, each zone marked by its own peculiar characteristics, telling of a progress from primæval chaos to the order of creation which heralded man's advent; so, also, the architectural remains of the past are distinguished by national characteristics; and we can trace by them the progress of the arts, from the rudest efforts of the primitive races up to the very highest achievements of scientific skill. Fossils are to the geologist what sculpture and painting are to the architect; fossil remains stamp the Devonian period as the age of fishes, the Oolitic as the age of reptiles, and the Tertiary as an age of mammals,—just as the features of architecture mark the power of Assyria, the faith of Egypt, the intellectual excellence of Greece, and the piety of the Mediæval Christian. Geology and Architecture are, therefore, in this sense, but the two great chapters which make up the world's history in stone.

The study of Geology is, therefore, particularly appropriate for the architect, who, in applying the various materials of the earth's crust in the realization of his designs, should be somewhat familiar with their origin, if he would successfully employ them in securing variety, beauty, and the permanency of his structures.

But the connexion between Geology and Architecture is not merely fanciful; it is eminently practical, as is very admirably illustrated by Mr. Wilkinson in his "Practical

Geology and Ancient Architecture of Ireland." Travel where we will, we must observe how very much the architecture of every locality is affected by its geology: here granite prevails, there sandstone, and again limestone.

A limited knowledge of those local materials may suffice when a common-place building would satisfy; but when the architect desires to employ a variety of materials to enhance the value of his design, he should know where and what to select for his purpose; he should be capable of determining what the locality could yield;—he should, in fact, be as competent to direct the tradesman where to procure the required materials as to direct their use when found. Ignorance of the facts disclosed by Geology is unpardonable in an architect of the present day, and leads to endless mistakes, involving disappointment and expense. Examples of those failures will, no doubt, suggest themselves to you. A marked case came under my own observation, where a very extensive range of buildings were to be erected on a site adjoining quarries which produced a very valuable building stone. Stone of a similar kind was expected to be found on the site, and a clause was inserted in the contract, giving the contractor authority to quarry his materials on the site. Another clause provided that, in case the quarry on the site did not yield stone suitable for all the purposes of the intended building, he should be paid the extra cost of such as should be procured elsewhere. Now a little skill in tracing and identifying beds of rock would have enabled an observer to discover that the required stone could not occur on the site, as supposed. The contractor soon found this out after he went to the expense of opening the quarry, and had preparations made for removing large quantities of stone in block. There was really no proper stone to be found, and consequently he had to procure it elsewhere, and was paid extra cost on the quantity of stone required, which amounted to over 30,000 tons. Cases of this kind are not uncommon. I might refer to the failure of foundations, the use of improper materials, the use of imported materials at great cost, when equally good might be had nigh at hand, and many similar cases to shew the value of some knowledge of Geology; but I have probably said enough, if apology was needed, to justify me in considering the Building Stones, &c., of Belfast in a geological point of view.

Now, in order to understand the relative position and extent of the beds from which our building materials are procured, I must endeavour to convey some general idea of the Geology of the district, and in doing so I must first refer to what is the most marked feature of the Geology of the North of Ireland—

THE TRAPPEAN PLATEAU.

This basalt or trap rock covers nearly the whole of Antrim, half of Derry, and a small portion of the counties of Down and Armagh, including an area of from 1,000 to 1,200 square miles. Nearly the entire of this area is covered with trap, varying in thickness from 10 ft. to 1,000 ft., or more. Being a volcanic and not a sedimentary rock, it was poured over the underlying sedimentary rocks in a molten state, not from a single crater, but through a network of fissures or rents traversing the rocks below; all those fissures are now filled up with trap in every respect similar to the surface rock, constituting the well-known trap dykes of the North. All the trap was not poured out simultaneously—a succession of overflows occurred, now indicated by a series of beds

or layers of different thicknesses; and this volcanic activity continued in operation for a long series of years; in some cases the intervals between the overflows were sufficient to allow the surface of the trap to be denuded by atmospheric action before the subsequent overflow took place; and this atmospheric denudation is indicated by the beds of decomposed trap that alternate in some cases with the more solid beds of rock; and the beds of lignite or wood coal that sometimes occur between the layers of trap would seem to show that forests grew on the surface of one bed, and became overturned by a subsequent flow of molten trap, converting the wood into the coal we find throughout the trap district. All the overflows were not, however, sub-aerial, or poured out over dry land—many were submarine; nor was the material that issued forth always of the same character; sometimes the volcanic products were in an incandescent state, sometimes merely melted; sometimes they were, doubtless, in the condition of scoriæ, ashes, dust, or mud; and the varying conditions under which those materials were deposited—in the open air or under water, in thick or thin layers, whether they were cooled rapidly or by slow degrees—tended to produce the endless variety of trap rocks now occurring in the North of Ireland, from the solid columnar masses of the Giant's Causeway to the decomposed accumulations that now constitute the iron mines of Antrim.

We must not suppose that the beds or masses of rock thus formed constitute level plains—by no means. During the season of volcanic activity, when the trap rocks were poured forth, the surface that received each overflow was constantly altered by the same volcanic agency, so that the relative levels of the beds in various parts of the district differed considerably, and long after the discontinuance of the volcanic action the surfaces were exposed to atmospheric denudation, and thus we have the trap or basalt occurring from the sea level to the mountain tops, ranging from 1,300 to 1,800 feet high.

The trap district is almost entirely bounded by bluff escarpments, except about Lough Neagh, where the surface sinks to the water level. It covers the hills of Benbradagh, Keady, and Benyevanagh on its western boundary; it skirts the sea along the north, forming the cliffs of Downhill, and the rugged precipices which compose the grand coast scenery of the well-known Giant's Causeway. To the east, it bounds the coast and crowns the hills of Layd, Ardelinis, Tirmacreeven, and Ballygally, now skirting the shore with barren, rough, and rugged headlands, and then falling back to crest the inland hills, exposing a series of fertile glens, and forming a combination of coast and mountain scenery, so admired by the tourist along Sir Charles Lanyon's Antrim Coast Road.

The southern escarpment of the trap district forms the northern boundary of the valley of the Lagan, by a series of hills which sink westward to the level of Lough Neagh. Occasionally what we may call "outliers" of basalt or trap occur, separated from the main body by valleys of denudation. Knocklaid is an example, near Ballycastle, which is cut off by Glenshesk; Carrilea is another, cut off by Glenmakeevan, and Glendun. Scrabo Hill, in the County Down, is another example, where an isolated patch of trap rock is cut off by the harbour of Belfast in continuation of the valley of the Lagan.

The trap or basalt, as I have said, overlies

* By Mr. William Gray, Associate, Belfast. Read at Royal Institute of the Architects of Ireland, April 15th, 1869.

a series of sedimentary rocks, the first of which, in a descending order, is the Chalk or white limestone. Wherever it occurs it is found below the basalt, and crops out on the face of the trappean escarpments, varying in thickness from a few feet to more than 100 feet, the difference in thickness being, doubtless, owing to denudation, prior to the deposition of the basalt. In some sections it is absent altogether, and the basalt rests on lower formations. Although the Chalk of the North of Ireland is of the same geological age as the Chalk of the South of England, it is of a very different lithological character, for, whereas the Chalk of England is soft and friable, the Chalk of Ireland is quite a solid limestone rock, being thus altered by contact with the overlying basalt, those portions of the rock nearest the Dykes being most altered, and, in some cases, converted into a crystalline marble.

Below the Chalk the Greensand occurs, having a thickness of about 30 ft. to the south, and thins out to about 2 ft. along the northern boundary of the trappean district. This rock always occurs at the base of the Chalk, and is exposed only in the sections along the boundary of the basalt.

The next formation that occurs below the Greensand is the Lias, the whole series of oolitic rocks being absent. The Lias is represented by patches of shaley limestone and beds of clay. The limestone of this formation does not occur so as to admit of its extensive employment for building purposes; the thickest development of it occurs at Waterloo, near Larne, where it crops out between high and low water mark on the sea shore, and represents a thickness of probably 150 feet. It occurs in a more massive form at Portrush, but there it is so altered by contact with the basalt that it has lost the character of limestone, and is converted into a hard species of lydian stone.

Below the Lias, or along the base of the trappean escarpments, the New Red Sandstone formation crops out, constituting the sloping undercliffs, and extending over a very considerable area. In County Antrim, on the east and south, occupying the whole valley of the Lagan, and extending into Down as far as Newtownards and Greyabbey; on the west it occupies a portion of the Myola valley, and a great portion of the water-shed of the River Roe. It is not represented on the northern boundary of the trappean district.

The formation next below the New Red Sandstone is the small patch of Permian or Magnesian limestone that occurs near Cultra, in the County Down, and is exposed close to the shore.

Below the Permian is the Carboniferous, and this is very well represented within the area to which my observations have extended, and which includes the counties of Antrim, Armagh, Derry and Down, with a small portion of the County Tyrone.

At Ballycastle, to the north of the County Antrim, it is represented by a series of sandstone beds, resting upon the Carboniferous limestone; those beds are exposed along the cliffs from Ballycastle to Murlock Bay, and they extend inland over an area known as the Ballycastle coal-fields.

Beds of more compact sandstone, and occasional beds of limestone, occur from Cookstown to Dungannon and Coal Island, in a district known as the Tyrone coal-fields. Then the Carboniferous limestone, so largely developed throughout Ireland, is represented at Armagh, and in the County Down at Castle Espie, near Comber, by a light red limestone, and at Greencastle, County Down, by some beds of blue limestone.

The Devonian system is not represented in the North, unless it is by the coarse conglomerates and sandstones around Cushendall and Cushendun, County Antrim, which have been described as Devonian or old red sandstone, but which are now supposed to be belonging more properly to the New Red Sandstone, the stratigraphical position of which, as we have seen, is above and not below the Carboniferous.

The next rocks—lowest rocks—occurring

around Belfast are the Silurian slates, and which occupy a very large portion of the County Down, and the Cambrian rocks, which occur over a considerable area in the north-east of the County Antrim; and then we come to the granite, or lowest rock of the series, which constitutes the Mourne range of mountains to the south of the County Down.

We have, therefore, within the comparatively limited area, comprising the counties of Antrim, Derry, Down and Armagh, the representatives of all the Irish geological formations, while several beds occur within that area that are not found elsewhere in Ireland.

Let us now enquire into the economic value of those several formations represented by the specimens I have brought for your examination; and, in considering the rocks, I will begin with trap or basalt, and then go on to the various other formations that underlie the basalt, taking them in a descending order.

Owing to the nature and origin of the basaltic overflow, a great variety of rocks must be expected, and they occur over almost the whole district, from soft ochrous beds to compact rocks that ring with a metallic sound under the blow of the hammer. Their general character, however, is a rough, hard rock in irregular masses, broken up by fissures and joints, and very unevenly bedded. Of course being an igneous rock, it is not laminated in its structure, but in large sections it assumes the appearance of stratification, owing, doubtless, to the manner in which it was distributed by a succession of overflows. It is not therefore as available for building purposes as those rocks that have a stratified structure, or that occur in more compact masses; and, owing to the difficulty of quarrying it, as well as dressing it when quarried, and above all the uncertainty of procuring rectangular blocks, it is not used for good ashlar, or any kind of tooled work, unless on very rare occasions. For rubble work, however, it is very generally used throughout the trappean district, and in many of the work-houses, churches, mills, bridges, schools, and other structures it has been employed with success. In those cases, sandstone, brick, or the Chalk limestone has been used for dressings, quoins, &c. A very good example of this kind of work is now in course of erection at Ballymena.—I refer to Col. Adair's castle, which Mr. James Henry is building, from the designs by Messrs. Lanyon,—here the dressings are of Dumfries red sandstone.

The nearer this rock approaches the columnar trap, the better it is for hammered work; it then pitches freely, and may be tooled; but the greenstone, or porphyritic varieties, are wrought into shape with very great difficulty and risk. A quarry of this rock near Dundonald, in County Down, and another quarry near Carrickfergus, have yielded some good blocks, and supplied some of the coping or curbing of the new docks, Belfast. But there is really no good quarry opened and properly worked where an order could be executed with certainty. Contractors have themselves to work the quarries when they require any quantity of material; and as their interest in the quarry ceases with the completion of their contract, they have no inducement to clear the quarry for permanent working; nor would the quantity of stone disposed of from any single quarry, even of the very best kind of basalt, pay for working it on an extensive scale. Where the basalt occurs in the columnar form, the blocks are sometimes used in their natural shape for coping, sills, and even for rubble masonry. An old church near Ballintoy is built of columnar trap, the columns being laid with their ends to the face of the wall, the spaces between the octagonal, hexagonal, or pentagonal blocks being made up with spawls.

The trap rock is found to be very useful for making roads, both for the formation and macadamizing, and this in some degree accounts for the superior roads of Antrim. Large quantities of broken stone of this kind is used in Belfast, where it can be had for 3s. per ton. This is generally hand-

broken, but at the Whitehead Works it is broken by a crushing machine, and sent by rail to Belfast.

Besides the basalt, we have another set of igneous rocks that have been forced up through the stratified rocks, and are now found on the surface. I refer to the Porphyries, of which we have two varieties in the North. There are varieties of the basalt, porphyritic in character, but the rocks I now refer to are distinct Porphyries. One kind occurs near Cushendall; it is very dense and hard, of a dark purple colour, in some cases beautifully veined, and capable of being polished; it is, however, only used for ordinary rubble work and road metal, as other kinds of stone are to be had in the locality more readily wrought into form.

The other variety of porphyry is the pearl stone, which occurs at Tardree, in the County Antrim, and in a limited patch near Moira, County Down. It is not worked for building purposes in the County Down, but very good quarries are worked at Tardree, which yield a very fair sample of stone, capable of being used for sills, quoins, steps, and curbing. It has been used with good results in the entrance to Shane's Castle, at Randalstown, and in various other buildings throughout the country. When selected, it can be had of a good uniform colour, but in the quarry there are numerous veins of rusty stains that injure its appearance very much; it occurs in somewhat of a columnar form in the quarry, and can be had in length to 6 ft.; blocks of ordinary sizes can be had in Belfast at 10d. per foot cube. A man will work six to eight superficial feet per day.

The Chalk limestone occurs nearly all round the trappean district, and crops out from below it. It is not commonly used as a building stone, being very hard, brittle, and extremely uncertain in working with small tools. It is very seldom used for wrought work; for rough hammered quoins and coping it is sometimes made available; but the great bulk of this rock, so very extensively quarried throughout the County Antrim, is used for lime, or is shipped for the ironworks of England and Scotland. For this purpose large quarries are open at Belfast, Whitehead, Magheramorne, Island Magee, Glenarm, Carnlough, Glenariff, and Ballintoy, and the quantity of limestone annually produced by those quarries probably amounts to 150,000 tons. At Belfast and Carnlough it is quarried on the hill-sides, and conveyed to the quays by tramways. At Whitehead, Magheramorne, Island Magee, and Glenarm, it occurs close to the water, and piers have been built, from which it is shipped. It is carted from the quarries in Glenariff to the pier at Red Bay, and at Ballintoy the extensive quarries of Messrs. Herdman occur close to the beach. Here the company had to construct a dock of about half an acre in extent, excavating it in solid rock to give a depth of 10 ft. at low water, for the security of the vessels employed in the limestone trade.

At Glenarm, whiting is manufactured from the Chalk, and shipped from thence to various parts of the country.

In preparing the Chalk for lime-burning or shipment, it must be separated from the flints which are interstratified with the Chalk limestone, and large quantities of these flints accumulate in the quarries. They are not used for building purposes, as in the South of England; some are shipped for pottery works, and some may be used for the manufacture of cement.

The lime yielded by the chalk rock is that known as rich or fat lime; in some cases it contains small grains or peas of imperfectly calcined lime, which takes a longer time to slack than the body of the lime. When this occurs, special care must be taken with the preparation of the mortar, else when it has been on the wall for a short time those peas of lime swell, and throw off large scales of the surface rendering. The lithological character as well as the chemical composition of this limestone is more or less affected by the associated trap. The following is Dr. Hodges' analysis of these specimens:—

Localities from which the samples were procured.	Carbonate of Lime	Carbonate of Magnesia	Phosphate of Lime	Oxide of Iron	Silica and Clay
Glenariff, Co. Antrim	95.03	.55	.18	2.00	1.20
Whitehead, do.	99.07	.05	.06	.50	.15
Moira, Co. Down	96.80	.76	.12	.40	.55

Showing an excess of iron in the chalk limestone from the north of Co. Antrim.

The occurrence of the indurated clays of the trap series, in conjunction with the chalk limestone in the Co. Antrim, and in such quantities, offers very great facilities for the manufacture of a good hydraulic cement, and should not be lost sight of; all the necessary materials can be readily procured in any quantity, and from Dr. Hodges' analysis and Dr. Ritchie's experiments, those materials are capable of being converted into a good cement, that would command a remunerative price in the market.

The Greensand below the chalk is not used as a building stone; it occurs as a yellowish sandstone in Collinglen, near Belfast, and as a coarse grit stone towards the north of the County Antrim; but, as it is not compact or uniform in texture or colour, it is not fit for the mason's use.

The Greensand rests on the Lias; there being no representation of the oolitic series, and as Lias occurs between the Triassic marls and the Greensand at the base of the Chalk and Trap escarpments—now generally covered by a talus or accumulation of fallen rock, resulting from the wasting surface of the cliffs—it is only exposed where this talus is removed, or where the bed crops out close to the sea, or in river banks; it is thus occasionally exposed all round the Trappean district, but never to such an extent as to be made available for those building purposes for which its nature and properties render it most suitable. Experiments have been made with it, and it has been found capable of making hydraulic lime, but has not been quarried for that purpose, owing to the absence of exposed sections where it might be had in quantity. There can be no doubt, however, that the Lias occurs all along the eastern escarpment below the talus of fallen rock, &c., and the extent of the beds occurring there must be considerable if they are, as is probable, equivalent to the liassic outcrop at Waterloo, near Larne, Whitepark Bay, near Ballinterry, or the beach near Portrush. According to Dr. Hodges, it contains—

Carbonate of Lime	..	..	71.66
Carbonate of Magnesia	..	..	2.67
Phosphate of Lime	..	..	.49
Oxide of Iron	..	..	9.42
Silica and Clay	..	..	14.61

It is quite possible therefore, in my opinion, to make the Lias beds of the County Antrim available for the manufacture of hydraulic lime, a result which is most desirable, particularly around Belfast, where, from the nature of the substratum on which the town is built, a good hydraulic lime would be a very valuable addition to the available building materials of the district.

At Portrush, where the largest development of the Lias occurs, the rock is completely altered in its lithological character and chemical properties—so much so, indeed, as to have been for a long time considered a purely igneous rock—it is in fact converted into a hard lydian stone; and although occurring in large tabular masses fully exposed above the surface, it is wholly unsuitable for any kind of masonry, as it cannot be touched with the hammer or chisel.

Along the Antrim coast road, and in the neighbourhood of Belfast, extensive landslips have been caused by the water-springs of the Greensand flowing over the soft, unctuous marls of the Lias. Vast rock masses of chalk and basalt have thus broken away from the mountain cliffs, and have become scattered in confused heaps over the slopes of the undercliffs, and add considerably to the variety and picturesque grandeur of the coast scenery. Earl Vane's Castle, at Garron Tower, has been erected on one of those vast landslips that fell down *en masse* over the liassic and triassic marls.

The New Red Sandstone formation is made

up of a series of variegated marls or clays of great thickness overlying the sandstones proper. The clays, or Kueper marls as they are termed, occur all round the base of the trappean escarpments, particularly in the County Antrim, and, although some 600 ft. thick, they yield nothing capable of being used for building purposes, with the exception of gypsum, which occurs in layers through the lower clay beds which crop out along the shore at Whitehead and Carrickfergus. This is the rock from which plaster of Paris is manufactured in France and England; it is not used for this purpose in the County Antrim, as the imported plaster can be had much cheaper than it could be made in this country, owing to the difficulty of making arrangements with the landowners.

Beds of rock salt of considerable thickness occur also in this formation, and are worked at the well-known salt mines of Dunerue, near Carrickfergus. The lower beds of this system yield excellent building stones, and are developed principally in the County Down, the chief quarries being at Scrabo Hill, near Newtownards, worked by Messrs. Ritchie and Jackson. Those quarries yield a great variety of excellent stone, some of which is of very good quality. The enterprising proprietors have opened up the quarries, and made preparation for executing orders to almost any extent; any reasonable size stone can be had to order, and is delivered in Belfast at 1s. per foot cube. The stone is easily worked, a man being able to do about 10 ft. of ordinary chiselled work in a day on the hardest stone. The stone varies in colour; when desired of one colour, it must be selected; the extent of the quarries now admits of this being done much better than formerly. The contrast between the colours of the stone is not violent; it may, therefore, I think, by a little care, be very properly used mixed, and lose nothing in effect, for, after all, the stone is laminated, or, as the masons call it, "reedy," and after a little exposure to the weather, the stunning of the tool is cast off and the reed of the stone is exposed sufficient to make one stone differ from another.

Good landings, steps, engine-beds, and foundation-stones, to 30 and 40 superficial ft., can be readily had at those quarries. This stone has been used in a great many public and private buildings (Stormont Castle is a good example), and in consequence of the facilities now afforded by the superior mode of quarrying and transporting the material, it will probably be still more largely used in future.

The yellow and red sandstones of this formation occur along the lower levels; stone similar to Scrabo Hill, but very much softer, occurs near Lisburn; this quarry may yield better stone if the deeper beds are made available. At Dundonald, County Down, or between it and Newtownards, a very good quarry occurs of the deep-red sandstone. Very good blocks can be obtained here, but, being soft, it will not stand exposure to the weather. Similar stone underlies the tertiary clays of the valley of the Lagan. They have been exposed at the Belfast gas works when sinking the foundation for the new gasometer; very good blocks of the Dundonald red sandstone were used at the Belfast new docks.

The Permian rocks are represented by the yellow magnesian limestone and sandstone of Cultra, County Down. They have been formerly quarried for building purposes, and this material has been used for dressings, &c., at the old Castle of Carrickfergus, at the opposite side of Belfast Lough. The out-crop occurred close to the shore, and the sea interfered very much with quarrying operations. This is a dolomite of the same geological character as the much-abused stone of the Houses of Parliament in London. At Cultra, where it occurs, villas and pleasure-grounds are springing up all round, and it is more than probable that this limestone quarry will be shut out from the market in future.

The Carboniferous rocks are well represented in each of the counties around Belfast, and yield excellent sandstone and limestone

for building purposes. The principal sandstone quarries are about Dungannon and Cookstown, but so situated as to make the cost of conveyance very great. They produce stone of any size, and suitable for every purpose, from the most ponderous and massive structures to the most delicate and finest work. Messrs. Kennedy, Howard, and Scott have each extensive quarries about Dungannon, and send away large quantities of material. Mr. Cooper has also several large quarries at Cookstown. The difference between the several quarries is not greater than the difference between the beds of the same quarry. Mr. Kennedy can supply very large surfaced rough stones from the top of his quarry, suitable for foundations, &c.; his middle beds are good samples of light-colored sandstone, occasionally stained with iron. The section would be—

Top bed, yielding rough stone 6 ft. square, 14 in. thick.

12 ft. bed of hard block, for engine beds, &c.

12 ft. of good white stone.

12 ft. of various beds, from 6 in. to 14 in. thick.

Cost—Foundation stones, 3s. 6d. per ton at railway station; 6s. 10d. at Belfast. Ordinary building stone in block, 10d. per foot cube; 14d. at Belfast. Special sizes to 2s. 6d. per foot cube.

Mr. Howard's quarry adjoins that of Mr. Kennedy, and is somewhat similar in section; he has, however, a bottom bed, a light blue color when quarried, and dries out very like the Ayr sandstone, and is like it in texture. It cleaves to any dimensions, at 1s. per foot cube, or 1s. 4d. in Belfast.

The stone in Mr. Scott's quarry is of a coarser kind, a brighter color, and not so laminated as those just mentioned. It is quarried in large blocks, which may be cut to any size; it is a good durable stone, and tolerably uniform in colour throughout the quarry. It costs 10d. or 11d. per cube foot at station. From 8 to 10 superficial feet of chiselled work is a day's work for a man on any of those sandstones at the quarry. They all become harder as they lose their quarry damp. The insurance office in Victoria-street, and the new insurance office in High-street, Belfast, are good examples of Dungannon stone, from Scott's quarry.

Mr. Cooper's quarry at Cookstown has three kinds of stone; the top (hard rock) is a light-coloured sandstone, very close in texture and extremely hard; about 5 superficial feet of ordinary chiselled work on this stone would be a man's day's work. This stone can be had of all sizes; the ordinary sizes are 1s. 2d. per cubic foot at Cookstown station, and 1s. 5d. in Belfast. Below the hard rock there is a bed of cream-colour stone, very fine in texture, but the supply is limited. The lower part of this quarry consists of soft sandstone in beds of various thicknesses, 2d. per foot cheaper than the top rock. In an adjoining quarry, called the Lynu quarry, Mr. Cooper quarries a very good flesh-colour sandstone of superior quality. The Provincial Bank, Belfast, and the base of the Masonic-hall are being built from the Cookstown quarries.

The Carboniferous sandstones occur also at Ballycastle, County Antrim, being a development of the coal measures similar to the coal measures of Cookstown and Dungannon, and coal is found in both localities. In general the sandstones of Ballycastle are not so compact or close in their texture as those of the Tyrone coal-fields; they crop out on the almost perpendicular face of the cliff, and comprise the finest section of the coal measures in Ireland. Some beds of good sandstone occur, and, although it is coarse and open, it is very durable, as is proved by the old tombstones in Boneymargey and other graveyards. Owing to the difficulty of transporting the stone over rough mountain roads, its use is confined within a very limited area. It can be scabbled out in blocks at about 8d. or 10d. per cubic foot, and it is very freely wrought; a man could chisel up to 12 feet superficial in a day, with ease, so that if means were available for shipping the stone

it might come into the market on favourable terms. A good pier could be very easily constructed close to the quarry face, and such a pier would be very desirable also for shipping the ironstone and fireclay found on the works. Besides the sandstone, the Ballycastle quarries yield beds of limestone capable of producing large blocks for any kind of heavy work, such as quay or dock walls, &c. This limestone, although it occurs in large quantities, is not at present quarried for any purpose.

The best quarries of Carboniferous limestone are at Armagh, from which a good supply of light grey limestone can be had in blocks to two or three tons. This would be a very useful material for heavy works, but for light works the stone should be carefully selected to avoid the joints with which it is intersected, and which become more apparent after a little weathering, spoiling the appearance of the work, and making it look unsound. The stone from the Navan quarry, two miles west of Armagh, is not so objectionable in this respect, as the stone from the Ballyharidan quarries to the south of Armagh. The new Roman Catholic Cathedral at Armagh is a very good example of this stone. The stone is raised in beds from 6 to 24 inches thick, from 3 to 4 feet wide, and up to 8 or 9 feet long, and is delivered at the railway station at 9d. per cube foot; stone for rubble work, 1s. per ton. The Armagh marble quarry, the property of the Lord Primate, is close to the town, but it is not extensively worked. Occasionally a few blocks are raised and cut up for chimney-pieces, but there is not sufficient trade to keep the quarry in constant operation. Large quantities of this limestone is burnt into lime for building and farm purposes.

A limestone of the same geological age and mineral character crops out at Castle Espie, on the shore of Strangford Lough. The late Mr. Robert Murland expended a large sum in opening up those quarries and erecting a series of kilns on Hoffman's principle, perhaps the most complete in Ireland. The works are now in full operation, and large quantities of limestone is converted into lime. The stone is very like the Armagh limestone, only that perhaps it is a little brighter in colour. The beds dip rapidly, and rest unconformably on the Silurian slate; and I am inclined to think that the area occupied by this limestone is confined to a small patch in the neighbourhood of the quarry. At the south of the County Down a blue carboniferous limestone occurs at Greencastle, probably the representative of the Dundalk beds. It is not used for building purposes to any extent.

A very fair sample of sandstone of a light red color occurs near Cushendall. I am not quite certain of its geological age; it has been considered Devonian, so I will refer to it under that head. It occurs along the river side near Cushendall, and near the shore at Cushendun. At the latter place it is found in connexion with the curious coarse conglomerate which constitutes the rock caverns of that locality. It is not extensively quarried, and its use has been chiefly confined to the locality. The Duugiven sandstone is of quite a different quality, but probably of the same geological age. It is a good, close-grained, compact, light-colored material, capable of making excellent work of a most durable character. The new bank at Maghera is a good example of this stone. The quarries, however, occur in such an out-of-the-way place—some three miles from Dungiven,—it can scarcely be forced into competition with other stone.

We now come to the Silurian rocks, which occupy a large portion of the County Down. They are very slaty in character generally. The series of beds make up a thickness of thousands of feet. They dip very rapidly, in some cases being almost perpendicular, and present a broken, jagged surface, so extremely dangerous to shipping along the coast. As a building material, those beds are very unsatisfactory, as the stone will not bear the hammer, and is therefore never used except for rubble

work. An exception to the general character of the stone occurs at Ballygowan, near Comber, where there are beds of extremely compact stone, dense, close-grained, and a good uniform color, resembling dark blue limestone or compact greenstone. Extensive quarries have been opened for the working of this stone by Messrs. Ritchie and Jackson, and Messrs. Robb and Co., of Belfast, and large quantities of the material are converted into stone-sets for streets, curbs, channel-courses, crossings, pitching and road metal. The stone raised at the quarries is taken to Belfast by rail, and is there converted for the various purposes for which it is so admirably suited; indeed it is wrought so very industriously that not a fragment is wasted—every chip is utilised. The advantage of the stone for economic purposes is, that while it is very hard—almost as much so as any igneous rock,—it cleaves readily, and can be hammered into shape without showing scarcely the mark of the hammer. Column blocks, curbing, and crossings are taken from the large blocks; street-sets of various sizes are made from the smaller stones; the large spawls are used for rubble work, or for hand-pitching road surfaces; the smaller pieces are broken up for road metal, and the smaller chips, &c., are screened; the fine portion is sold for gravelling walks, &c., and the coarse screenings are used for “blinding” road metal when first laid on. Street sets are made of various sizes from 3 in. square up to 5 in. by 7 in.; the former is sold at 16s. per ton, the latter at 12s. 6d.; the cost of the material for a yard of paving is about 3s. on an average. This stone might be very properly used for column blocks, coping, plinths, string-courses; but, owing to its hardness, a man could only do about 4 superficial feet of chiselled work on it in a day.

Slate has been quarried from the Silurian rocks on the Greyabbey estate in the Ards, and a slate of good quality for roofing and for slabs has been taken from the quarry. The works have been given up for some years; but there is every reason to suppose that if the quarries were properly opened up, and skillfully worked by some enterprising speculator, they are capable of being made amply remunerative.

The foundation rock of the whole series of rocks already referred to is granite. It constitutes the whole Mourne range, occupying nearly the southern half of the County Down. On the east side it is quarried from the side of the mountain within a few miles of Annalong, where the granite is close-grained and of a light color. It splits readily into long lengths, and it is a common thing throughout the country to see gate-piers 10 in. or 12 in. square, and 6 ft. to 8 ft. long. Messrs. Gordon manufacture large quantities of curbing for streets, &c., and ship them at Annalong for Belfast, Liverpool, &c. Curbs 10 in. by 8 in. can be delivered at 2s. per yard in Belfast. The defective accommodation for vessels causes considerable delay in the execution of large orders, and has an injurious effect on the trade. Mr. Gordon's quarry supplied the stone for the Bank of Ireland, Donegal-place, Belfast.

The principal quarries for the supply of County Down granite are about Newry, and at present the principal quarry is that worked by Messrs. H. Campbell and Son, called the Ballyholland Quarry. It is worked from the top rather than from the side of the hill, as it should be; yet it is capable of producing very fine blocks. I have measured in the quarry at one time blocks 26 ft. by 9 ft. 6 in. by 4 ft., 29 ft. by 2 ft. 3 in. by 7 ft., and 27 ft. by 7 ft. by 5 ft. 3 in.—in fact blocks of stone up to 70 tons, and the whole quarry is almost of one uniform color and texture. Stones of any dimensions can be had, but there is no means provided for removing stones larger than 3 tons.

The constituent minerals of this granite are very finely and uniformly distributed. There are no large horse-teeth of felspar as in the Cornish granite, no large flakes of mica as in the Kingstown granite, or those veins and iron stains that sometimes disfigure

granites. It is a close-grained stone of uniform colour, capable of being wrought to any size, to any degree of finish, and to take a glassy polish. It has been used in various buildings in the North of Ireland; for monumental works in London; for the docks in Glasgow, and is now being used at the New Exchange at Liverpool. At the quarries it is wrought into street sets, and sold at from 17s. to 19s. per ton, covering 4 to 5 yards to the ton. The price for building purposes varies with the dimensions of the stone required.

There are several other very good quarries around Newry, and improvements are daily being made in the mode of quarrying, dressing and transporting the stone. The greatest improvement of this kind has been made by the establishment of Mr. Henry Jordan's granite polishing works, where about 100 superficial ft. of polishing can be done every week, principally used for monuments, a large number of which are sent to Liverpool and other places. Columns to 2 ft. diameter can be prepared and polished for about £3 per lineal foot. Mr. Jordan uses a flesh-coloured granite from a quarry adjoining the town, and which bears a very good polish.* Preparations are being made for the introduction of polishing machinery into other works, and it is to be hoped that enterprise in this direction will be rewarded by the extension of the export trade, and the more frequent employment of polished granite at home.

Granite has also been quarried near Castlewella, and the Castlewella Granite Company supplied the granite for the Albert Memorial in London. The surrounding steps, the landings, diagonal pedestals, the grey columns in the angle clusters, and the monoliths from which the clusters of columns spring, were all constructed of Castlewella granite. Each of the monoliths weighed 17 tons, and, with all modern appliances for polishing, employed ten men for sixteen weeks to bring up the four faces to their present lustre. The company employed a traction engine to convey the huge blocks from their mountain bed to the pier at New-castle, a distance of six miles from the quarries, a great portion of which is rough, irregular mountain roads, but difficulties like these are readily overcome by skill and enterprise, though they may be sufficient to paralyze and deter the timid speculator.

All that I have said in favour of the Newry granite applies with equal force to the granite from the hills of Castlewella; the dimensions of the blocks attainable are only limited by the available means for their transportation, while, for uniformity of colour and durability, it cannot be surpassed; even the surface rock that crops out around the heather is as fresh and clear as the recent section of the rock below, and there are no beds of kaolin to indicate feldspathic decomposition, or gravel pits to measure the process of decay.

Let architects and engineers, therefore, remember that, no matter what their requirements may be—monuments for columns, docks, fortifications, or embankments—the granite quarries of Down can supply their every demand with a material which for texture, colour, or durability, cannot be surpassed by the favoured productions of Aberdeen, Mull, or Cornwall. It only remains for me to add that, from the number and variety of building stones represented on the table, it will be evident that the north-east of Ireland is rich in most excellent materials, which only require for their development a better system of quarrying, so that consumers could rely upon the immediate execution of their orders. The railway companies should also give every facility for the transportation of the stone at cheap rates; and masters and men should make it their constant aim to keep down the cost of production, if they ever expect to successfully compete with the quarrymen of Scotland, who send such quantities of stone to the North of Ireland.

* Specimens of this granite may be seen at the office of the IRISH BUILDER.

METEORIC SHOWERS.

IN continuation of the course of Saturday Afternoon Scientific Lectures at the Royal Dublin Society, Mr. G. Johnstone Stoney, F.R.S., Secretary to the Queen's University, delivered a very interesting one on the above subject, on the 3rd ult. We give below such portions of it as will enable our readers to judge of the general nature of the subject:—

When observers band together to watch every quarter of the sky, and to keep on the look-out through the whole night, the number of meteors that present themselves is very great. In this way it has been ascertained that upwards of thirty on the average, which are conspicuous enough to be seen without instruments, come within the view of the observers stationed at one locality. And it is computed that telescopic meteors must be about forty or fifty times as numerous as those visible to the naked eye. These results may be obtained from observations made at one station; but when concerted observations are carried on at different stations, several other facts of interest come to light. By simultaneous observations at distant stations, it has been discovered that the height of meteors above the surface of the earth usually ranges from 120 down to twenty miles, the average height being about sixty miles; that the direction of their flight is towards the earth, either in a vertical or in a sloping direction; and that their speed in most cases lies between thirty and fifty miles a second. We thus arrive at the conclusion that *visible* meteors are phenomena of our own atmosphere; and as the atmosphere reaches a height at most of 150 miles, and is, therefore, but a thin film over so vast a globe as the earth, it is obvious that the spectators at any one place can see only a very small portion of the meteors which dart about through all parts of this envelope. After making allowance for this, we are forced to conclude that no fewer than 300 millions of these bodies pass daily into the earth's atmosphere, of which about seven millions and a-half are large enough to be seen with the naked eye on a clear night, and in the absence of the moon.

From the direction and swiftness of their flight, it is manifest that meteors are visitors from without. They plunge into our atmosphere, and the resistance to which they become then suddenly exposed must raise them to a temperature which exceeds that of the most intense furnace. The heat is enough first to melt and then to dissipate in vapour the most refractory substances, and it only now and then happens that even a part of a meteor escapes this fate, and reaches the ground. They are for the most part dissipated in vapour ere they get within several miles of us. The difficulty, indeed, is not to account for their incandescence, but to see why they do not emit a greater flood of light where the heat must be so intense. And, in fact, they cannot be other than very small bodies, or they would be much brighter. The average weight of those visible to the unassisted eye appears to be under an ounce, and the telescopic ones, of course, are much lighter.

Meteors may be distributed into two very obvious classes—casual meteors, which dart irregularly through the sky, and meteoric showers, which stream into our atmosphere in one definite direction, and at stated intervals of time. We are concerned at present with the meteoric showers. Many such are known to exist, of which the principal are the August shower, through which the earth passes every year upon the 9th, 10th, and 11th of August; and the great November shower, which is discharged upon the earth three times in a century. The November meteors are those about which most is known, and it was of these, therefore, that the lecture chiefly treated.

In these vast celestial spaces, there are no rails over the roughnesses of which the train must be made to rattle, if it is to move at all; there is no air in which a wind must be produced; there are no wheels to be worn out.

The music of the spheres is not a sound audible to the ear, and an impediment to motion: it is harmless, it is altogether good, it is the pleasure of the human mind when it understands the great works of nature. There is no thundering along through the heavens. All is silence and peace around the planets as they swiftly glide. Bodies which sweep in this way without obstruction through the depths of space, are ready to yield at once the due amount of obedience to the attraction of the sun. Accordingly each meteor which traverses the elliptic orbit represented in the diagram, mends its pace so long as it is gliding along that half of its course in which it is approaching the sun, because here the sun is drawing it forwards as well as sideways; and the forward attraction increases its velocity, while the sideward attraction bends its path into the oval form. The meteor takes upwards of sixteen years to traverse this part of its orbit, and all this time its velocity is on the increase. It has attained its greatest speed when it reaches the point of its orbit which is closest to the sun, near to which is the place where it crosses the earth's path. As it passes this point its velocity is twenty-seven miles a second. The earth moves at the rate of nineteen miles a second in very nearly the opposite direction, so that if the meteor happens to strike the earth, the velocity of its approach is the sum of these two numbers, or forty-six miles a second; and it is at this enormous speed that it plunges into our atmosphere. But if it escape the earth, and continues its course along its orbit, it loses speed for the next sixteen years, until it passes the farthest part of its orbit at its slowest pace, which is about a mile and a third per second. In each revolution its velocity oscillates between these extremes. Its orbit is so vast that it takes thirty-three years and a quarter to get round it.

There are countless myriads of meteors in this mighty group, each one moving independently of the rest, each one fulfilling its own destiny. They form, together, an enormous stream of meteors, which appears to be about 100,000 miles in width, and of immense length. The actual train is so amazingly long that even moving at the rate of twenty-seven miles a second, it takes upwards of two years to pass the point where its path crosses the earth's orbit. The earth passes this point on the morning of the 14th of November in every year. The head of the stream seems to have reached it early in the year 1866. The earth was then in a distant part of its orbit, but on the following 14th of November we came round to the place where a dense part of the stream of meteors was pouring across our path. The earth then passed through the stream, just as you might imagine a speck, too small to be seen by the eye, to be carried on the point of a fine needle in a sloping direction through the thread which represents the meteors. The earth took above five hours to pass through the stream; and it was Europe, Asia, and Africa, which happened at the time to be moving forwards. Accordingly it was upon this side of the earth on that occasion, that the meteors were poured, and they produced the gorgeous display in our atmosphere which we all remember. In 1867, when we came round again to the same place, the stream of meteors was still there. America, this time, chanced to be the part of the globe which was turned in the right position to receive the shower. Even in 1868, the mighty stream had not entirely passed, and this year, when we come round a fourth time to the proper place, we may perhaps find ourselves among the hindermost stragglers of the great procession.

The learned lecturer next referred in detail to those scientific men who had directed their attention specially and laboriously to the marvellous history of meteors, and concluded a highly instructive lecture as follows:—

We have now traced an outline of the marvellous history of these Arabs of the sky. We have found a comet wandering through boundless space, with nothing near it except an occasional solitary meteor. We have seen it in the long lapse of ages slowly

gathering together a cluster of these little strangers. In its travels it passes within the far-spreading reach of the sun's attraction, and perhaps has since been millions of years in descending towards him. Its natural course would have been to have glided round him in a curve, and to have then withdrawn to the same vast abyss from which it had come; but in attempting this, it became entangled with one of the planets, which dragged it out of its course and then flung it aside. Immediately, it entered upon the new course assigned to it, which it has been pursuing ever since. After passing the planet the different members of the group found themselves in paths very close to one another, but not absolutely the same. These orbits differed from one another very slightly in all respects, and amongst others in the time which a body takes to travel round them. Those meteors which got round soonest, found themselves, after the first revolution, at the head of the group; those which moved slowest fell into the rear, and the comet was the last of all. Each succeeding revolution lengthened out the column, and the comet soon separated from the rest. Fifty-two revolutions have now taken place, and the little cloud has crept out into an extended stream, stretching a long way round the orbit, while the comet has fallen the greater part of a revolution behind. We can look forward too, and see that in seventeen centuries more the train will have doubled its length, and that ultimately it will form a complete ring round the whole orbit. When this takes place, a shower of these meteors will fall every year upon the earth, but the swarm will be then so scattered that the display will be far less imposing than it now is.

Such is the history of one of the many meteoric streams which cross the path of the earth. There are several of these streams, and no doubt the story of every one of them is quite as strange. And if there are several streams of meteors, which come across that little line in space which constitutes the earth's orbit, what untold multitudes of them must be within the whole length and breadth of the solar system! Perhaps it may even turn out that the mysterious zodiacal light which attends the sun, is due to countless hordes of these little bodies flying in all directions through the space that lies within the earth's orbit.

THE PHOTOTYPE.

WONDERFUL (says the *English Mechanic*) as are the triumphs already accomplished by photography, or by its aid, we have not yet, it would appear, got to the last. Witness the beautiful plate in this week's impression, produced by phototypy. How it is accomplished, as to the first processes, has not yet been published by the Phototype Company; but the results to be seen at the Company's offices are wonderful to a degree. On what sort of a matrix the photograph *fac simile* (if that be used) is deposited we know not; but the "electros" turned out for printing from the ordinary printing press are first-class. Fancy the uses in one or two cases. It is desired to reproduce a heavily-illustrated book—the copperplates are lost, but photographs are taken from the prints and turned into phototypes for printing from, at a comparatively insignificant figure. Again, it is desired to copy a picture for publication in a book. To engrave it and its companions would be to place the book beyond the reach of the general public; in steps the phototype, and the thing is done. Thus it must eventually prove a public benefactor—in fact, all kinds of "line engravings, etchings, and drawings, prepared for the block," we are assured, may be reproduced by the phototype. Some of the work we have seen is peculiarly soft in treatment, and the work produced from the printing press was quite equal to that from a well-executed wood engraving. We are told the thing is as yet in its infancy; if so, "seeing what we have seen," what will be the manhood of the invention?

WATERPARK, CASTLECONNELL,
NEAR LIMERICK.

WITH this number we give an illustration of Waterpark, Castleconnell, the residence of John Lecky Phelps, Esq. The property was purchased about ten years ago by Mr. Phelps, and the old house remodelled with offices and lodge added at a cost of about £2,000. More recently, a new house has been added in front of the old (which has been converted into subsidiary offices) at an additional cost of £4,000. The new house consists of a hall 14 ft. wide, and extending the height of two storeys, with handsomely panelled walls, and coffered ceiling; staircase to correspond, separated by a handsome arcade; two drawing-rooms, each about 24 ft. by 18 ft., connected by folding doors; library, 20 ft. by 16 ft.; dining-room, 24 ft. by 18 ft., and a complete set of bed-rooms, dressing-rooms, &c. There is a neat conservatory off the drawing-room. The exterior is finished partly in stone and partly in cement. The chimney-pieces and internal decorations of colour and gilding are of very superior character, having been executed under the direction of the architect, by Messrs. Sibthorpe of Cork-hill. The internal doors are of Riga oak, also the margins of floors. The site commands delightful views of the Shannon and rapids of Doonass. There is a turbine for water supply, erected by Messrs. Ross and Murray. The general contractors were Messrs. Wallace and Son, of Limerick; the ironmongery, grates, and some of the chimney-pieces being supplied by Messrs. Hodges and Sons. The architect is Mr. W. Fogerty, F.R.I.B.A., of Harcourt-street, and 1 Westminster Chambers, Victoria-street, London.

THE SHAW MEMORIAL, CASTLEWELLAN, CO. DOWN.

AT a meeting of the tenantry of the Earl Annesley's estates, convened to take into consideration the best form in which to express their respect and esteem for the late George Shaw, Esq., J.P., for many years agent to these estates, it was resolved to erect a memorial drinking fountain, and a committee was formed to carry out this resolution. Plans were invited in competition, and a prize offered for the best design; nine were sent in, and of these the committee have adopted the one proposed by Mr. Chappell, architect, Newtownards, and awarded him the prize. The plan at base is that of a square with the corners taken off; above the plinth the plan changes, the corners being weathered into pedestal, leaving the central parts projected 18 inches; the pedestal is 9 feet 7 inches at base above steps, and carried up to a height of 11 feet, and is neat and well proportioned; it supports a handsome canopy of open Gothic work, with toothed and moulded arches, and sufficiently high to receive a figure. The roofs are carried by twelve pillars, with toothed and moulded caps and bases, the ceiling being groined. From the intersection of these roofs springs a well-proportioned octagonal spire, with sunk panels on each face, and carried up to a height of 40 feet to top of finial, which, together with those on gables, are ornamental. On each side of pedestal a panel is inserted for arms and inscriptions. The crests are set in moulded arches at the top of pedestal, and the monogram, G. S., on a shield in each of the four gables. The fountains are designed in imitation of the natural rock. The work is to be executed in the Castletwellan granite, similar to that used in the Prince Consort Memorial, London. Mr. O'Flinn, builder, Castletwellan, has been entrusted with the contract for the work.

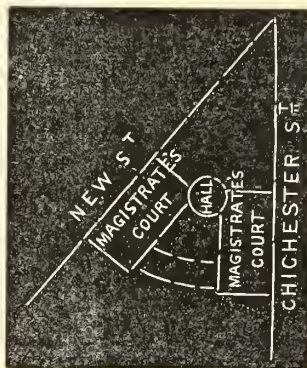
NOTES ON THE DESIGNS FOR THE
MUNICIPAL BUILDINGS, BELFAST.

(Continued from page 89.)

THE design next in order on the walls of the Belfast Council-room is one by Messrs. Sherry and Hughes. The first thing that strikes the spectator is the marvellous tower and the curious note which refers to it. The note is pasted on the elevation near to the tower. Perhaps we ought charitably to suppose that some wag, knowing the idiosyncracies of this Town Council, and feeling certain that so much money would never be spent on such a monstrosity—perhaps, we say, this note is



not to be attributed to the authors of this design, but, like other drawings that have been tampered with, it may be said of it, what has been written on one of the drawings (to which we shall allude), "this is a goak!" The note is this—"It is intended only to raise the central tower as high as the string-course A at the roof at present, the completion of the tower in accordance with the drawings to be postponed until the future Town Hall or other proposed building is proceeded with." The plan of this design provides for a future civic hall. The elevation towards Chichester-street of the Courts of Justice is not so bastille looking as that towards Victoria-street. The plan of the courts is peculiar. It has its advantages. It is something like a joiner's rule partly open thus:—



The cells are underneath. The authors have published a lithographic view, with a letterpress description, to which we shall have to allude. At present our business is simply with the original drawings. We consider, in fact, that these supplementary affairs are entirely out of order in a competition. They are complete pests. If architects did not suppose that there existed incompetence in the committee to be worked upon in a manner quite out of the rules of professional propriety, these supplementary lithographs and photographs would not appear and be hawked about somewhat in the manner of advertising bills that are thrust under the front door. In a case where the committee do not and will not act—as decency should act—by obtaining experienced professional judgment upon the original drawings, we do not expect anything less than these efforts. A committee who dawdle in such a matter says by such an act—"Come and influence me—" "Come and—see what I'll do for you if you'll do something for me."

The next design, as we pass on, is marked No. 1. J. S. Whittington. The number one has no relation whatever to any order,

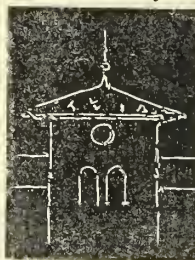


either of catalogue or of merit, though it is

a very meritorious production. One thing in the plan would never do—the council chamber ought not to be towards the noisy street. The Courts of Justice are well arranged, and so is the Fire Brigade Station. The design is of Italian character, and very neatly drawn.

No. 13. This, although a long skip from No. 1, numerically, is close beside it locally. It is badly designed, and worse drawn. One of the courts seems to have been omitted. At all events, we could not find it in our search. Only the elevations are hung up; and, although it is perhaps as well not to see too much of such an attempt, we do not thank the "hanging committee," who ought conscientiously to have hung everything, not omitting themselves. This design seems to be meant for "Gothic." It appears to have been scratched in from the inkstand. If the absurd condition of competition, that the drawings might be "tinted with Indian ink or sepia only" had been strictly enforced, we fear these elevations which seem to be guiltless of the one or the other might not have adorned these walls. It would be difficult to design or to draw much worse.

We move on to No. 15. F. G. Cregan, Dundalk. Much worse did we say? This design certainly is worse. As No. 13 represents the abomination of desolation in "Gothic,"



so that before us gives the *Bombastes Furioso* of 'Italian.' It out-Italian's Italian. These are the proportions of the tower, as nearly as sketching without measuring will give them. We need not describe the plan, as the designer seems not to

have matured it.

No 10A. Fogerty and Drew. This plan is very good. The shape of the ground on which these buildings are proposed is like this:—

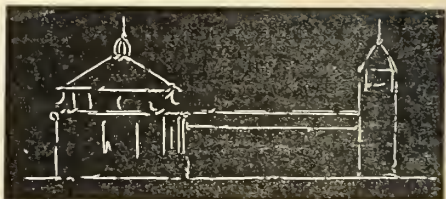
The architects here have placed the council-room, which is semicircular on plan, at the left-hand side. Although this would make a very elegant and convenient council-room, yet we fear there would be an insuperable drawback in its being in the public street. The

VICTORIA-STREET.

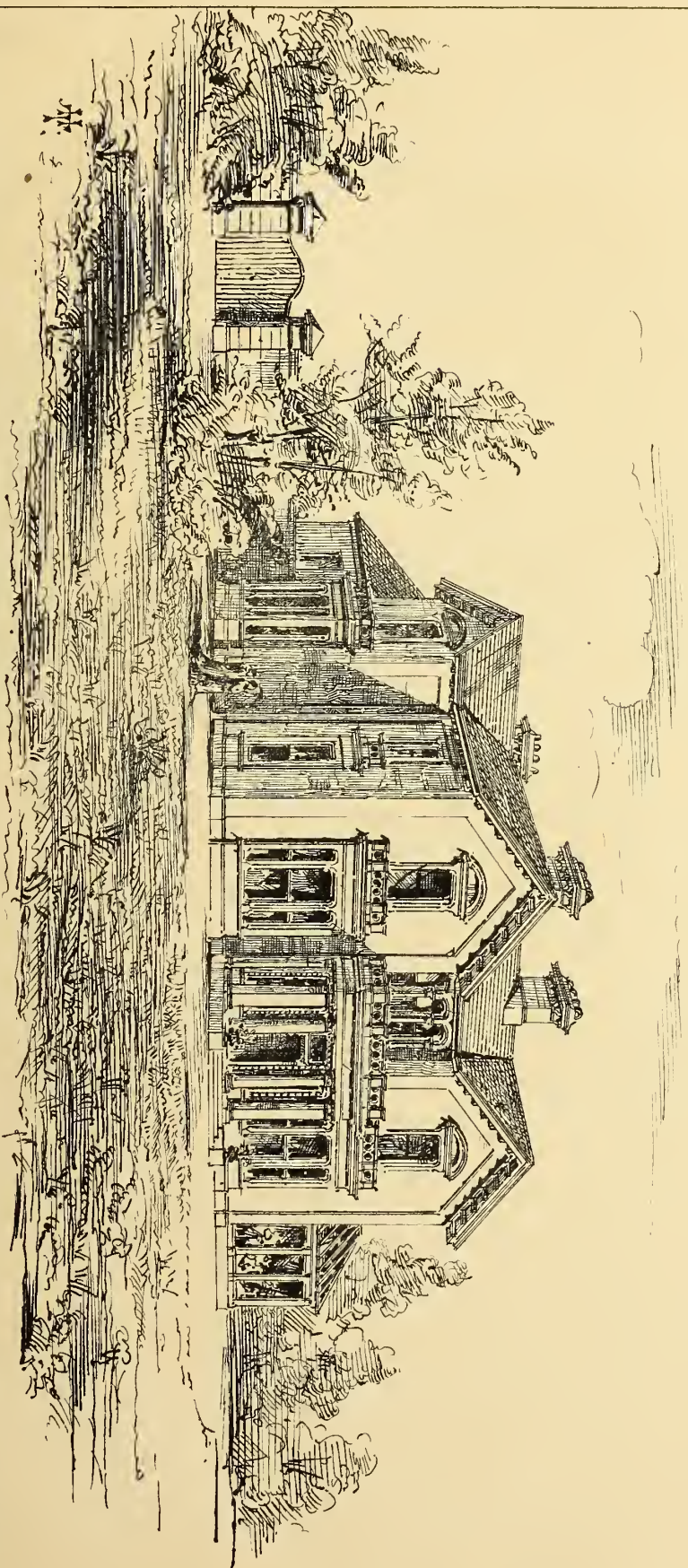


elevation is very imposing, and is very effectively drawn and coloured.

We regret that this design along with others has not met with at least some proportionate amount of consideration to the study which has produced it. No one who bestows the smallest amount of consideration



on several of the masterly and clever suggestions contained in some of the plans in this exhibition, and reflects on the abrupt brutality



NO. WATERPARK. CASTLECONHILL. NEAR LIMERICK & W. ROGERRY ARDRE.

that has consigned them all to limbo, but feels as though there has certainly been a casting of pearls before swine. It is true that as yet we may not have described many of the former; but that is our fault.

Passing on, however, we come to an extraordinary effort with an eagle or a phoenix rising in the centre of the picture. The artist is J. Moncrief. The tower is after the Hull Town Hall. The plan is absurd. The back elevation is very ugly. There is a chimney-stack in the centre of the roof of the plainest description. Some one has marked it and written in pencil—"This is to be altered." We should hope so.

The remarks in pencil and the dirty finger-marks that have been made on the drawings since this exhibition opened are very discreditable. There is a design by Lanyon and Lynn which has been so marked. There is a great deal of writing on it by the authors. They state that they do not like to contradict the council with reference to the sum named, and are not aware whether the council has

the means to carry out these plans, &c., against which is written in pencil—"this is a goak." It is, we think, in the worst taste to send in designs disfigured with writing. No artist surely would do so. It seems an apology for the badness of the design.

No. 5. W. Atkins. The elevations of this design are very pleasing. In the plan there seems too much space taken up in corridors.

The municipal buildings have a central tower—picturesque, but too prison-like.

The elevation showing the courts is more appropriate, and displays greater breadth and simplicity of treatment than any yet noticed.

Since writing the above, these drawings have all been bundled up and swept away to make room for the paper-hangers. We see that Prince Arthur is to pay a visit to Belfast, and we suppose this paperhanging enterprise is on that account. The paper appropriately is the colour of mud. On the occasion of this royal visit, we see that "no speeches are to be made by the corporation, by particular desire." We are glad that the Prince will be spared this piece of consummate impudence, and will thus have to breathe the deleterious air for only a short time. It is something, however, for this slovenly and sluggardly town council to be imbued and moved even with the small spirit of paperhanging. Where the drawings have been poked to by their goodly doings, it is impossible to tell. We are sorry to be thus precluded by this town council from doing justice, which, as far as lay in our power, we would have done. This, however, will not preclude action in the matter of the swindle.

A note has just reached the office of the IRISH BUILDER intimating in polite terms that the drawings have been returned to their several authors. The "Town Hall Committee" do not affirm that the designs were unsuitable. The one they speak of having "selected" has been absent from the rest for some months. This sudden impulse seems only less abrupt than the false report and false statements to which we drew attention some weeks ago, which it blandly supposes is forgotten by the competitors. Having got rid of the drawings, the Belfast Town Council seem to suppose that they have heard the last of this detestable affair. Perhaps it would be desirable, but we cannot say so. What deception to send the note to the competitors now, as though decision had just been arrived at, when the report alluded to was in the public papers months ago!

CHAPEL BUILDING AMONG THE WESLEYANS.

"THE annual report of the Wesleyan Chapel Committee shows an outlay of more than £200,000 in building operations for this year. This includes 126 new chapels, the cost of which averages as nearly as possible £1,000 each. Of these there are about 20, the expenditure on which is from £2,000 to £8,000; while at the other extremity of the scale there are many at one-tenth of these amounts. The views in the report for 1868 are not equal in execution to some of those in former volumes. In several instances they evidently fail to do justice to the designs; and it must be confessed that the latter can ill afford to lose the advantage which a good style of engraving or lithography would confer on them. Longsight Chapel, Manchester, erected by Mr. Woodhouse, at a cost of more than £7,000, is the most noticeable among a series which are even more uninteresting than the average. We have formerly had the pleasure of noticing some two or three chapels which seemed like the beginning of an architectural advance among the Wesleyans; but nothing of the kind is observable in the present publication. Longsight Chapel has the usual low wide nave, narrowed in front by the ordinary mean-looking spirelet on one side, and a small staircase turret on the other. There are short transepts towards the pulpit end. The front closely resembles that of the Congregational Church, Tottington, by the same architect, though it is somewhat inferior in detail. Of the other "Gothic" designs in the report we would rather not speak. One can only wonder what sort of people it is whose tastes such things represent. It is easy to understand, and even to feel a certain respect for those who prefer a plain, substantial, well-built meeting-house of the old-fashioned sort, with no beauty, it is true, but at the same time with no aggressive vulgarity about. But the class that can take pleasure in the chapel Gothic of the present day, in ornament that is not ornament, and in shoddy architecture that is far enough from being even good building, is one much more difficult to sympathize with. It must surely be the same class whose prophet is Dr. Cumming, and their philosopher, "A. K. H. B.," to whom the author of "Queechy" is a far greater novelist than the author of "Adam Bede," to whom Tyn-dall and Huxley are names unknown, and to whom Darwin has only been introduced by the anathemas of their denominational magazine. If this be so, they have developed an architecture admirably corresponding to their literature; but the misfortune is, that while the rest of the world are not obliged to read the one, they can hardly escape anywhere from seeing the other."

We extract the foregoing from the *Building News*. As far as England is concerned, it is too true. "Aggressive vulgarity" is certainly more accountable for this "development" than the principles of truth. We attribute much of the coarse and sprawling pseudo-Gothic Architecture which has developed itself in this age amongst the English Methodists, to that absurd book by Mr. Jobson, on "Chapel and School Architecture amongst the Wesleyans." Mr. Ferguson, in his book on "Modern Architecture," says, that a common cookery-book will teach you as much Architecture as the mass of Architectural works. This, of course, is "bancombe." Such reckless talk, however, does much harm, especially when used by one who has much influence. We shall not, however, be guilty of this sort of talk ourselves, when we say that any architect's assistant could not make a worse hash of Gothic architecture than by following the suggestions of Mr. Jobson's cookery-book. Mr. Jobson himself, we believe, was once an architect's assistant. On the strength of this he seems to have supposed

he had a mission to teach architecture to the Methodists. John Wesley published a book on medicine, but it was altogether out of his "mission." The style of modern Methodist chapels in England is pure Jobsonian. The special element that characterizes these structures is one which could not be better expressed than by the writer in the *Building News*,—"aggressive vulgarity."

HOMAGE TO ART.

ON Monday last, the 19th inst., about three o'clock in the afternoon, an amusing incident occurred in the British Museum. It appears that three young ladies, apparently sisters, and of the respective ages of from 19 to 22 or 23 years, were passing along, taking the greatest interest in everything they saw. At length they chanced to come upon a sleeping Cupid. There he lay, with a most delicious dream-smile on his face: they gathered round him, and, with the true sympathy of woman, soon began to smile also. "What a sweet child!" exclaimed one. "What a dear, lovely boy!" sighed another; and they gazed and revelled in silent ecstasy over this embodiment of the sculptor's genius. But the eldest of the three certainly put the climax on the whole, for, without any idea of the possibility of the thing, or the logical sequence of what she was about to say, she breathed forth, "*What a handsome man he would have made!!*" We put three notes of admiration to this whispered expression, so warm and intense was the feeling that ushered it into the world. What next and next? Why they all looked silently at each other, and at the dreaming marble before them, when, with that touch of nature which is said to make the whole world kin, they each bent over the sleeping God of Love, kissed him in turn, and went away with lingering looks behind.

Like most other mundane joys, it had, however, its shadow—but very light; in fact, so lightly did that shadow fall at the blissful moment, that those poetic daughters of Eve will not have known of its existence until they read these lines. To be plain, then, a young art-student was quietly ensconced behind a group of statuary sketching something before him, and perfectly hidden from the sight of the ladies. When he saw the unusual turn which affairs had taken, he crouched down, and almost hid himself in his boots. Poor fellow, what a Barmecide feast was his!

"But time at last brings all things even,—
And if we do but wait the hour."

To him our readers owe the discovery.—
Builder.

ANCIENT MONUMENTS IN IRELAND.

MR. AGAR-ELLIS, on Monday, in the House of Commons, asked the First Commissioner of Works whether Ireland would be included in any measure he might bring in for protection of ancient monuments, as indicated in his answer to the hon. member for Buckingham on the 2nd inst.

Mr. Layard said:—The Office of Works has no control or jurisdiction in Ireland. The Irish Board of Works is under the Treasury. There are many most valuable and interesting national monuments in Ireland which might be placed under proper supervision, as many such monuments in Scotland are, and I think that the time will come when they will be taken care of and preserved. My attention has been called to the subject by many communications which I have received from Ireland, and I may especially allude to one from the President of the Royal Irish Society, Lord Talbot de Malahide, who has most kindly offered to be of any assistance to me in the matter. I can only say that if it should be determined to place the national monuments of Ireland, like many of those of Scotland, under the care and jurisdiction of the Office of Works, I would do my utmost to take measures to preserve them. But this is a matter which does not rest with me.

A LEGISLATIVE ENACTMENT TO REGULATE ARCHITECTURAL COMPETITION.

It would be difficult to point to a source of greater corruption than architectural competitions. As a general rule they somehow or other result in notorious injustice. Often, indeed, these competitions do not appear to be even *bonâ fide* on the part of the originators. It is, of course, hardly to be wondered at, if a committee, who are in general comparatively unacquainted with art, and therefore unfit to judge of the merits, should almost invariably drift (to speak mildly) into disreputable dealing. Even if the competition originates in a simple desire to obtain the best art-suggestions by this means likely to be procured, there is every probability that unless experienced art-skill and disinterested aid be employed in adjudicating on the designs, the result will be unsatisfactory.

While, however, we cannot blink the fact that the upshot of the pseudo-deliberations of competition committees usually result in a piece of jobbery, disgusting to the competitors, and insulting and injurious to the art, we do not, at the same time, hide our eyes from the fact, that unworthy means are often employed by competitors themselves to influence those in whose hands the decision is supposed to rest, especially if they be, as is generally the case, incompetent hands. Unless a like architectural knowledge to that which has responded to the competition be employed in adjudicating upon it, there is necessarily this incompetence. To the tender mercies of such incompetence architects too often trust themselves. If there be any great lapse of time—as there generally is—between the day of sending in plans and the conclusion of the competition, it can hardly be wondered at that there may not be competitors who will become restless, and by hook or by crook ply the members of the tardy committee unduly in favour of *their* design. In this sort of game it seems to be held that “all is lawful in war.” The great grievance that attaches to the honourable profession of architecture in this respect is, that competition committees make no adjudication. They do not even make a choice. The merits of the designs are seldom entered into. A nine days’ wonder—it may be more or less—is afforded by the exhibition of the drawings, after which the men who have elicited all the pains and trouble thus taken seem to shut themselves up in blissful ignorance, or, more correctly speaking, nefarious stupor, to the fact of any designs having been sent in at all. In this state of coma, the spirit which may be expected to move them is not one by any means of an immaculate description. For while those of the competitors who are resting upon their oars, relying upon their merits, are awaiting a decision, some competitor, or competitors, are working while it is called day upon the stupor of the committee in a clandestine manner, with a “deil take the hindmost” contempt for the merits of their co-competitors, having become somewhat alive to the fact that not precisely merit—at any rate not merit without undue influence—is likely under these conditions to prevail.

Now, under these untoward circumstances, if a competing architect avails himself of methods which are disreputable to the profession, it may be asked, who can blame him? Has not the reputation of many an architect been established in this manner? Like the little rotten boroughs for which Mr. Disraeli so pathetically pleaded as affording opportunities for ushering into fame aspiring virtues that would otherwise remain unknown, so architectural competitions afford a field for the display of talents that but for a little vigorous pushing might on their merits remain less recognized. There is no doubt that while there are examples of scope to talent that has been afforded by architectural competition, at the same time by far the greater majority of competitions have resulted, first in a disreputable delay, and next in an immature and abrupt termination, con-

signing to the dust heap all the designs obtained but some bald effort which, if ever carried out, is only a memento of injustice and an example of bad architecture—“this is the house that Jack built,” and thus, as Antony says,

“The evil that men do lives after them.”

The rock on which competitions usually split is with regard to the matter of *cost*. A sum is usually named in the conditions, for which so-and-so and so-and-so must be built. Strange to say, that although this sum is one of the most problematical points, in general there is almost always a foregone conclusion on the part of the committee with respect to this point. Sometimes they have the modest assurance to demand a guarantee from the wretched architect that his designs shall not exceed the amount thus stated. When this demand is acceded to, it but too plainly shows the miserably disreputable state into which the art of architecture has sunk, as far as these sort of competitive—or rather pseudo-competitive—transactions extend.

And the unprincipled system is becoming prevalent. It is not easy to tell whether *any* architectural competition is *bonâ fide*. We do not make this statement without good reason. When we take into consideration the fact of the number of experienced architects who respond to the requests of committees or corporations, it would be ridiculous to suppose that there is not sufficient *bonâ fide* skill from which to make a fair and judicious selection. It would also be ridiculous to assert that there is any want of ability to decide the matter promptly and fairly, and with a satisfactory sense of justice being given to all the competitors. To secure this desirable end a legislative enactment is specially required. Architecture and architects must be protected from the swindles and the ignorance of committees and their illegal legalities.

It may, indeed, be truly said that in the matter of architectural competitions “law is not justice.” There is usually a condition attached to competition advertisements, that provided the advertisers *think* that none of the designs sent in are sufficiently meritorious, they will not guarantee to make any award. Now this is one of the favourite loopholes of escape. It is very easy if the committee is lazy, if it is biased, or if it alters its mind, and acts on some principle or condition never before discovered, to say it does not *think* any of the designs deserve a prize; but, quite irrespective of any conditions, it takes one of the plans and—*presto*, begone all the rest! Why is such conduct legal? What are architects about? Are corporations to be permitted to trifle in this manner? These things are

“Gross, open, palpable.”

Law officers of corporations consider the matter “carefully”—not to see how honour can be maintained, how fairness may be manifested, how justice may be done, but—to ascertain if their trickery may be legalized, if the shuffling may be sanctioned, if the gross partiality may be made to wear a show of harmony with their pretensions of honour, and if their utter incapacity to enter into the merits of the plans may be made by its arrogated conceit of wisdom to shield them from the charge of having insulted, degraded, and libelled the architectural profession. While withholding a guarantee on their part, they get hold of one of the architects, and demand from *him* a guarantee that the proposed buildings shall not exceed in cost the sum named!

Now, we appeal to the architectural profession not to allow things to remain in this unsatisfactory state. Why should it be legal on the part of a body of men any more than an individual to obtain goods under false pretences? It seems perfectly clear that where architectural competitions are responded to by numerous designs emanating from reputed architects, and when the committee “shuffle off this mortal coil” without properly adjudicating on the merits, there cannot have been a *bonâ fide* intention on their part. It may perhaps be true, as a

committeeman of this type tauntingly said, that an “architect does not so much look to the prize”; but, at any rate, he looks for honest dealing. If this sort of dealing is now nowhere, as far as architectural competitions are concerned, it is both in the interests of the architectural profession and of general society that a law bearing on the subject should exist. It is not well to appear to pass by the flagrant acts of injustice that behind the scenes are constantly being done. Each one of them adds another degradation to the architectural profession. The medical, the chemical, and other professions are protected. Why should not the architectural profession be protected? The Government professes to foster art. Here is an especial point. Let the Institute of Architects take it up. It may to some at first sight seem unnecessary or impracticable; a little consideration will prove it to be neither. Unless a law on the subject is passed, both architecture and architects will continue to degenerate, while the morals of men in committees and corporations will on this point be not one whit above those of bubble companies.

THE ROYAL IRISH ACADEMY.

A GENERAL meeting of this academy was held on Monday evening at 19 Dawson-street. The chair was occupied by Lord Talbot de Malahide, President. His Lordship read two papers, one entitled, “Some account of Megalithic Monuments of the Basses Pyrennees;” and the second, “Notes on Prehistoric Remains in various parts of Spain.” His lordship gave interesting inscriptions of the antiquities which were the subjects of his papers, and observed that they resembled many of the ancient Pagan monuments in Ireland, especially one of the great megalithic tombs of Autiquera in the province of Malaga. A discussion, in which Professor Hennessy, Sir William Wilde, Dr. Frazer, Mr. Kelly, Mr. C. J. O’Donel, Dr. Ferguson, and Professor Sullivan took part, followed the reading of the papers. On the motion of Professor Hennessy, seconded by Sir William Wilde, it was resolved that the papers be printed by the academy. Professor Sullivan acknowledged several contributions in the shape of books, &c.

THE SINAITIC INSCRIPTIONS.

As your (*Athenæum*) correspondent, who says that he has discovered the key to the Sinaitic Inscriptions, does not give us the results, it may interest your readers to be told that they are, for the most part, in Hebrew characters, though of a very rude form. Many of them begin with the well-known word *זכרון*, *in memory of*, followed by the name of the person, and ending with *שלם*, *farewell*. Others begin with *זכרתי*, *memory of*, omitting the prefixed preposition. This word, it will be observed, is Syriac and Chaldee, but not strictly Hebrew. I have not seen any of the inscriptions copied by the surveying party now in the peninsula,—I am quoting those published by Mr. Grey in the *Trans. R. Soc. Lit.* 1832, and copied from the rocks in Wady Mukatteb. Mr. Grey also, at the same time, published some Greek inscriptions from the same rocks, beginning with the corresponding word *ΜΗΝΕΩ*, *let him be remembered*. Mr. Grey found no indications of sepulchres in the neighbourhood, or we might have supposed the persons named in the inscriptions had been there buried. As the Greek inscriptions may safely be claimed for the first three centuries of the Christian era, we may suppose that most—or, at least, many—of the Hebrew inscriptions are of the same age, and probably written by pilgrims on their way to the top of Mount Serbal. The name Serbal may very possibly be a corruption of Sephar, the name given to the holy mount in Genesis x. 30, and which may be translated *written*. The name Shapher, given to the same mount in Numbers xxxiii. 23, may be only a corrupt form of spelling the same word.

TESTIMONIAL.

WITHIN the past week we have learned that Mr. T. Hevey—who for about three years has been connected with the firm of Messrs. Pugin and Ashlin, the eminent architects—had resolved on opening up a practice for himself. Those who have had the pleasure of his acquaintance will freely join with us in wishing him “God speed” through the stormy ocean of competition into which he is about to enter. He purposes making the northern capital his head quarters; there, we earnestly hope, his abilities will be duly appreciated and rewarded. We could say much regarding the excellent designs which have been produced from time to time by this young architect. It might not, however, be in good taste for us to particularise or comment upon any of Mr. Hevey’s works, as he is well known to

our readers as the  of our journal.

Having said thus much, we now turn to the subject of a circular which has been issued, announcing the intention of a few friends to present him with a token of esteem. We are glad to find that the list is already well filled, and we hope, in our next issue, to have the pleasure of chronicling the presentation to Mr. Hevey of such a *souvenir* as will, during his future life, bring back to his memory many happily (and not unprofitably) spent days during his early career in our city.

AMERICAN RAILWAYS.

THE latest advices in reference to the Lake Superior and Mississippi Railway from St. Paul to Du Luth,—the Lake Superior terminus,—are that it will be completed so that the cars will run over the entire line by the 1st of November next. The charter of this Company includes a northerly branch to the gold mines recently discovered on Vermillion Lake. A road is now under construction from St. Paul 300 miles westerly to Big Stone Lake on the border of Dacotah. It is all under contract, and will, when completed, make connection with the Sioux City Railway, which will extend the line to the Union Pacific at Sioux City. There is also under construction a railway, to be completed in two years, from St. Paul north westerly 466 miles to Pembina on the Red River of the North, which is the western boundary line of Minnesota. This road will open direct communication to the British settlements on that river, which is navigable for large-class steamers from Pembina to those settlements. These two roads, reaching out in different directions through rich agricultural sections of Minnesota, will very soon bring an immense trade to the head of Lake Superior. In connection with this trade, we learn that work will soon be commenced on the Northern Pacific Railway, the line of which will extend westerly from some point at the head of Lake Superior or Crow Wing, and thence westerly crossing the line of the road from St. Paul to Pembina. The surplus wheat crop of Minnesota is now fourteen million bushels annually, and with the augmented population, and the increased production, will soon reach twenty million bushels annually.

Du Luth is to be the terminus of the Mississippi and Lake Superior Railway, and to make Du Luth more easily accessible it is proposed to make a cut across Minnesota Point, thus giving at that point a capacious outer harbour, as well as a capacious inner harbour. Minnesota Point is a long Peninsula extending into the bay, and the distance across it, near where it joins the main land, is only a few rods. With this improvement the St. Louis River will be much more easily accessible and with diminished distance. A ship canal, only 30 miles long, will at some future time be constructed so as to connect

the Upper Mississippi River with the St. Louis River, below its Rapids, at a navigable point from thence to Lake Superior.

The wonderful progress of Minnesota in population and wealth, the rapid strides made in the construction of railways within the borders of that and adjoining States, and the connection of these railways with the trans-continental roads and the North-western settlements of British America, cannot fail to concentrate an immense trade at the head of Lake Superior within a comparatively short period.

NEW HIGH ALTAR FOR GLENFARN, DIOCESE OF KILMORE.

WE had recently the opportunity of inspecting a new High Altar which has been executed by Messrs. John Chapman and Son, of Bolton-street, for the Rev. John Maguire, V.G., P.P. The altar is entirely composed of various-colored marbles. The antependium is divided into three panels, with Italian veined framing, the mouldings of which are enriched with statuary ornaments. On the centre is sculptured the “Lamb and Cross”, enveloped with clouds, in Carrara marble. Panels at either end enriched with shamrock crosses of statuary marble on red marble backgrounds. The table moulding is of Italian marble, supported by four red marble columns, with statuary bases and carved caps. The tabernacle is of veined marble, with Sienna door, enriched with statuary dove and monogram. The arch over the door is enriched with hood-mould and crockets supported by corbels, terminating with a tripod finial. The super altar is of veined marble, with quatrefoil panels inlaid with green and red marble. The reredos or extreme panels are composed of veined marble, with Italian colored centres. The tabernacle rises to a height of 12 feet, terminating with ball and cross on an octagonal dome and canopy supported by shafts of statuary marble.

QUARTERLY HEALTH RETURN.

THE Registrar-General has just issued his quarterly summary of the Health of the City and suburban districts. He says:—As usual, bronchitis was the disease which caused most deaths during the first three months of the year. The number of deaths from bronchitis registered during the quarter amounted to 422, or 1 in 5.5 of the total deaths. During the corresponding period of last year the deaths from bronchitis numbered 371. Pneumonia or inflammation of the lungs caused 66 deaths, against 52 in the first quarter of 1868. To phthisis or pulmonary consumption 286 deaths were referred, or 1 in every 8.1 of the total deaths. In the corresponding period of last year 268 persons died from phthisis. Scarlet fever was very fatal, having caused no less than 153 deaths, or 1 in every 15.2 of all the deaths. Sixty-four deaths resulted from fever, viz., 10 from typhus, 40 from enteric or typhoid, and 14 from simple continued fever. The deaths from fever in the corresponding period of last year numbered 107. One hundred and twenty-three deaths were ascribed to convulsions. Croup caused 37 deaths, showing an increase of 10 as compared with the first quarter of 1868. Whooping cough, which contributed 140 deaths during the corresponding quarter of last year, proved fatal in but 8 instances during the past quarter. One hundred and twelve deaths were attributed to heart disease; one to pericarditis or inflammation of the heart’s covering, and 10 to aneurism. Forty-one deaths were caused by liver disease, and 8 by jaundice. Forty-nine violent deaths were registered, of which 42 were caused by accidents, 1 by homicide, and 4 by self-destruction.

Weather.—The mean of the mean weekly temperature for the quarter, as returned from the Ordnance Survey Office, Phoenix Park, was 43.6°; at Greenwich it was 41.2°; at Glasgow 41.1°; and at Edinburgh 40.0°. The

rain-fall at Dublin during the thirteen weeks measured 7.722 inches; at Greenwich 6.62; at Glasgow 11.19; and at Edinburgh 6.70 inches.

PETROLEUM ITEMS FROM AMERICA.

THREE new wells are in process of drilling on West Hickory creek (Titusville), near the Beatty farm. They will be completed within the next three or four weeks. The Home Petroleum Company struck a new eighty-barrel well on the Blood farm, day before yesterday. The new well on Holmden Run, near Pithole, struck about one month ago, is producing a mixture of green and black oil. The production is about twenty barrels per day. The well is 840 feet deep, and the oil-bearing sand rock is about 30 feet thick. The well is owned principally by Mr. R. H. Broughton, of this city. A well struck in December last in the immediate vicinity of the above, at a depth of about 740 feet, has since yielded about two barrels of amber-coloured oil per day. A new well was struck about one week ago on the J. Buchanan farm at Rouseville; it is owned by O. Strong and Sons, and is producing about ten barrels per day.

L A W.

COURT OF EXCHEQUER CHAMBER.

(Before the Judges of the Courts of Queen’s Bench and Exchequer.)

Cardinal Cullen and another v. O’Meara and Mulvany.—This case originally came before the Court of Common Pleas in July, 1864, when an action was tried for the recovery of a sum of £4,384 17s. 6d., damages for an alleged breach of agreement on the part of the Dublin Trunk Connecting Railway Company, for the purchase from the plaintiffs of a portion of the lands of Clonliffe West, for the purpose of the railway. These lands had been taken by the plaintiffs, as trustees of the Catholic University, for the purpose of erecting university buildings thereon, under a lease dated the 7th of May, 1862, whereby they took the lands for 1,000 years, and covenanted, amongst other things, that they or their assignees would lay out within five years £3,000 in permanent buildings, and there was a clause securing the right of re-entry to the lessor in the event of a breach of these covenants. Upon the promotion of the Dublin Trunk Connecting Railway before Parliament it was proposed to take a part of the lands for the purpose of making the intended railway. The trustees of the Catholic University opposed the railway bill on the grounds that such an abstraction of part of the lands would render the rest useless for their purposes, and this led to the execution of the agreement in question, under which the defendants contracted to purchase the whole of the lands, and Mr. Brassington was appointed arbitrator between the parties to ascertain the price to be paid. The railway bill passed, and on the 16th January, 1865, Mr. Brassington awarded £4,366 13s. 7d. as the price to be paid. The lease under which the trustees had taken the premises was not produced to the defendants until the arbitration proceedings, and the defendants then alleged that a satisfactory title had not been made out, while the trustees alleged the contrary. The defendants having failed to complete their purchase and take the lands, the action was brought to recover the amount of the award. The case was tried at the after sittings of Michaelmas Term, 1866. The defence was that the railway company, and not the defendants, were liable, and that the defendants had no notice of the covenant about the expenditure of £3,000, at the time of entering into the agreement. The case was tried at the Michaelmas after sittings of 1866, before a special jury, who found that the defendants had not, at the time of entering into the agreement, any notice of the covenant in question. By direction of Chief Justice Monahan they found a verdict for the plaintiffs for £4,384 7s. 6d., the amount of the award, with liberty to the defendants to apply to turn the verdict into one for them, or to reduce the damages to a nominal amount. The defendants applied accordingly to the Court of Common Pleas, which decided that the verdict should stand. Against this the appeal was taken. The appeal having been fully argued, their lordships now gave judgment. The Chief Justice, Mr. Justice Fitzgerald, Mr. Baron Fitzgerald, and Mr. Baron Hughes were for reversing the decision of the court below. The Chief Baron and Mr. Justice O’Brien pronounced judgment in support of the order of the Court of Common Pleas. The majority of the judges having decided that the order of the Common Pleas should be reversed, an order to that effect was made, but without costs.

MESSRS. PICTOR AND SONS' QUARRY.

We are pleased to announce that the flooding of Messrs. Pictor and Sons' Corsham Down Stone Quarry has completely subsided, and that quarrying operations were resumed on Monday, the 12th ult. The workmen (nearly 100 in number) have been thrown out of work for the last twenty weeks, thereby causing great distress, happening, as it did, at the dull season of the year. The proprietors did all in their power to alleviate the distress by putting on as many of the men as possible at their other quarries, but, unfortunately, there was a great number unemployed. The flooding of the quarry is attributed to the heavy rainfall we had at the close of last year. The volume of water, when it first broke in, was computed at 60,000 gallons per hour. This continued to flow until there was water enough in the quarry to fill a lake equal to 3½ acres in extent, averaging 9ft. deep. The present working chambers were high and dry, but not accessible to by the workmen, the entrance being on the lower level, the stone inclining from the bottom of shaft at 3ft. in 100 consequently completely blocking the only entrance; in fact, at that point, the water was 15ft. deep, that is 7ft. higher in the shaft than the ceiling of the quarry. The proprietors, at considerable cost and trouble, are sinking another inclined shaft that will penetrate to the workings at a level above that reached by the water, so that in case of another flood every provision possible shall have been made that the working of the quarry will not be delayed an hour, as all new machinery will be fitted up for the purpose. It was very distressing to see the men walk to the quarry day after day anxiously watching for the water to abate, but they were doomed to many bitter disappointments. It was also a very trying for the Messrs. Pictor, as they had over 50,000 tons of excellent stone dried and fit for winter use, but were of course unable to get at it. They, however, have the benefit of it now, and we wish them a good year's trade, to somewhat compensate them for the very heavy loss they have sustained.

CORRESPONDENCE.

THE WANT OF AN ARCHITECTURAL ASSOCIATION IN BELFAST.

TO THE EDITOR OF THE IRISH BUILDER.

SIR,—There are now a considerable number of architects in the town of Belfast. The town itself is rapidly increasing in size, and year by year a higher class art is in demand for new buildings. The architectural profession, however, has no *locus standi*, except in regard to the individual practice. It is at the mercy of Tom, Dick and Harry. This is a great pity. Unity is strength. At present there seems to exist in the public mind a very low idea of the craft. To a great extent architects are themselves to blame for this state of things. Year by year the disadvantage increases. There are architects in the town who belong to the Irish Institute, whose head quarters is Dublin; but there is every reason why there should be a *locus standi* in Belfast also. The importance of the profession and its true interests imperatively demand it. It is to be hoped that the matter will be taken up. In hardly any town in the kingdom is there so little knowledge of architecture outside the profession, and withal so much assumption, as in Belfast.

SANITARY PRECAUTIONS IN THE CITY.

TO THE EDITOR OF THE IRISH BUILDER.

SIR,—Having learned that a sanitary commission was about to issue for England and Wales, it has occurred to me that the extension of its labours to Ireland would be very beneficial. As regards Dublin, there is scarcely a city in the empire at the present moment more backward in sanitary arrange-

ments than it is. Its backwardness fully entitles it to the epithet of dirty Dublin, which has long been applicable to it. It is truly a disgrace that our sanitary regulations and provisions are so imperfect. A stranger landing at the North-wall from either Liverpool or Holyhead must be struck with amazement as he passes along the quay, say as far as Commons-street, to behold the slovenly servants of hotel proprietors and liquor vendors ejecting the contents of their uncleanly pails before the doors into the street, there to form filthy pools from which a stench of a dangerous character is emitted. One is tempted to ask whether this is the fault of the proprietors in question, and whether the municipal authorities allow it? Whatever the answer to these queries may be, it is certain that the thing goes on with impunity. *If it be the duty of the police to prevent it, they are culpably negligent in the matter.* And if there be no sewerage to the houses in question, for the sake of the public health it ought to be provided at once. On Sunday the pools of water before some of the doors are simply disgraceful. Passing up Commons-street, which is off the North-wall, the sight is sickening in the extreme. The householders here throw all manner of refuse and slops into the street, and the malaria arising therefrom is only too well calculated to breed an epidemic. I do not know whether the Nuisance Inspector of the Corporation ever visits this district—if not, his presence might prove a boon to the inhabitants, i.e., if he exerted himself in their behalf. His attention to Commons-street and Mayor-street would, I am sure, be productive of good. But there are unfortunately very many such districts as the one referred to. On the south side of the Liffey—that part opposite the North Wall—slatternly housewives may be seen casting the elements of destruction into the street, and it would be easy to name many such places. The fact that this is so is the most complete proof that sanitary reform is much needed in our borough. Indeed all will admit this proposition, and it is a terrible truth that we are behind-hand in a science which is now so successfully cultivated in the large cities of England to the prevention of epidemics and other disorders. It is not too much to say that our rates of mortality would be sensibly decreased if sanitary laws were only better known and attended to amongst us. It appears that there are two parties who should make a movement in this matter—the Corporation and the people,—the former in making drains and sewers, and the latter in getting rid of their present slovenly habits of throwing their waste water and refuse into the streets. Each ought to labour to remove the reproach of uncleanness from our city, and thus keep far from us that terrible enemy which is looming in the distance—epidemic.

SALUT PUBLIQUE.

PARLIAMENTARY JOTTINGS.

PORTPATRICK HARBOUR.

MR. W. JOHNSTON called attention to the importance of maintaining Portpatrick Harbour in a satisfactory state. That harbour was dangerous to traffic in consequence of its being out of repair. The cost of repairing it would be only from £1,500 to £2,000. He trusted the Government would consider the danger that might arise from extinguishing Portpatrick light, and concluded by moving for a select committee to inquire into and report respecting the matter.

Lord Garlies, as representative of the county in which the harbour of Portpatrick is situated, seconded the motion. The line between Portpatrick and Donaghadee had been run from 1770 to 1846, and that was a reason for re-establishment. As there was no railway down to the water's edge on either side of the Channel, other points were taken in 1847, and that led to the establishment of the service between Holyhead and Kingstown.

Sir F. Smithett stated that the Portpatrick and Donaghadee route, in his opinion, now possessed all the requisites for complete, efficient, speedy, and safe service. It was said by the right hon. gentleman, the President of the Board of Trade, that £252,104 odd had been spent on the harbour already, but £70,000 of that sum had been spent for new works

on the north side since 1856. Unprecedented storms had made a breach in the pier on the south side, erected in 1839, and the harbour was consequently allowed to go to wreck and ruin. A petition was presented from Belfast, from the owners of thirty to forty sailing vessels, and only on the preceding day a petition was presented to the President of the Board of Trade from about seventy leading shipowners in Glasgow and Liverpool, praying that the light should be maintained. The right hon. gentleman must have found that there was a prejudice against the light, and he should consider that there might be also a prejudice against the harbour. They only asked that it should not be condemned without inquiry. Should the right hon. gentleman at the head of the Government go to Ireland to lay the foundation-stone of some one of the lunatic asylums proposed to be maintained out of the surplus funds derived from the disendowment of the Irish Church, he trusted that in his journey he would visit the harbour named after St. Patrick, and not destroy a place bearing the name of the patron saint of Ireland.

Sir J. Hay said the harbour of Portpatrick had cost this country about £250,000, and at the present time the south pier and lighthouse were suffering from a breach caused by the south-west gale. If this breach were allowed to continue, the lighthouse would in a short time topple over, a breakwater would be formed, and the harbour for ever closed. He was assured by a competent authority that a sum of £1,600 would remedy the present state of things; and he thought either a committee ought to be appointed, or the right hon. gentleman (Mr. Bright) ought, on his own responsibility, to have the works repaired.

Admiral Seymour thought the money would be well spent, particularly as it would save the lives of our sailors; but he was doubtful as to whether the route from Portpatrick was the best mode of communication between Ireland and Scotland.

Mr. Ayrton said the objections to appointing a committee on this subject were insuperable. The motion was based on an entire misunderstanding of the relations of the Government to this harbour. This arose out of the old system of carrying the mails in small packets when the Post Office thought it necessary to keep up certain ports. In 1820 the Government desired to establish the communication between Portpatrick and Donaghadee, and having done so, an Act levying an increased special rate of postage to defray the expenses of the harbour was passed. When the mail line between Holyhead and Dublin was established, the Government did not deem it necessary to maintain the special postal service between Portpatrick and Donaghadee. A penny postal rate was established, and the Irish people got the sea postage for nothing. A mail line was also established between Glasgow and Belfast; and so far back as 1847 the Post Office and the Crown decided they had nothing further to do with the harbours of Portpatrick and Donaghadee. A gentleman afterwards persuaded the Government to enter into an arrangement by which two railways would be established, as well as a line of steamers between these two harbours, but when the Government had spent some £10,000 or £50,000, it was discovered that the harbour of Portpatrick was not much better than it was before the money was laid out upon it. Her Majesty's late Government determined it was impossible to establish the service without further heavy cost. The Government dealt with the railway companies on the fairest terms, having lent over £160,000 at 3½ per cent. The second railway company, a Scotch company, was not so much in want of money, but it seized the opportunity of the loan. The money had been paid, and this being the case, he appealed to the House if they had not sufficiently paid smart money, and were not justified in wishing to have done with the business. The House had paid not less a sum than £1,545,000 in recent times for repairing the harbour of Holyhead, from which the dues received amounted only to £1,420 a year. For Kingstown harbour, in like manner, something like £825,000 had been paid; and in the present estimates there was a charge of £18,000 for putting it in order, and the amount annually expended on it was above £4,000 a year. There was a subsidy of £80,000 a year paid by the Post Office for the purpose of accelerating the communication between this country and Ireland. Would the House consent to a committee for a general inquiry, when the only suggestion before it was that a grant of public money should be made? Her Majesty's Government were most anxious to give every facility to any party proposing to take up Portpatrick Harbour and apply it to a useful object, and they were, in fact, prepared to do everything that could be wished without any committee, but they could not consent to such an expenditure as the motion invited.

Mr. Pim said it was wrong to hold out that the very heavy charge on Holyhead harbour was increased to keep up the communication between England and Ireland.

BROWN AND SON'S FIRE-CLAY GOODS.

In our report of the Royal Dublin Society's Spring Show last week we inadvertently omitted to mention that the eminent firm of Robert Brown and Son, Ferguslie Fire-clay Works, Paisley, and 56, North Wall, Dublin, and Queen's Quay, Belfast, occupied Stand 68, where they exhibited a large and varied assortment of Scotch fire-clay goods, which for utility and excellent design and finish could not well be surpassed. Farmers and others interested in drainage works will find the field pipes manufactured by this firm equal in quality, while cheaper in price, than those of any other house in the trade. Cattle feeding troughs, horse mangers, flower vases, and pedestals, wall coping, garden edgings, ornamental quoins, &c., all in fire-clay, were to be seen in wonderful variety. The numerous orders entrusted to the firm during the show is a fact sufficient to testify to the quality of the goods. — *Leinster Express*.

NOTES OF WORKS.

The new Lunatic Asylum for the counties of Cavan and Monaghan will shortly be opened for the reception of inmates. The architect is Mr. M'Curdy; the contractors, Messrs. Wardrop and Son.

A new church has been opened at Rathdrum, Co. Wicklow. The contractors were Messrs. J. and E. Barker, Up. Abbey-street, in this city. We understand that the works have been creditably executed.

MISCELLANEOUS.

IMPROVEMENT OF DUNDALK HARBOUR — At a meeting of the Dundalk Harbour Commissioners on Tuesday (Nicholas Carolan, Esq., in the chair) a resolution was agreed to authorising the expenditure of £2,000 on the outer works of Dundalk Harbour, and at the same time the engineer, Mr. John Neville, was instructed to make no outlay beyond that sum without consulting the board. The works will be recommenced at an early date.

In the debate on Tuesday night, on the site for the new Palace of Justice, the Chancellor of the Exchequer explained that the Government had resolved on building that edifice on the Thames Embankment instead of on the site in Carey street chosen by the Royal Commission. That this would be the decision of the Government we announced so long ago as January 23rd. Mr. Lowe also explained that the Commission would be dissolved, and that the works would be placed under the control of Mr. Layard. — *Athenæum*.

The question of reduced rates of postage, especially for newspapers and printed matter, has been taken up by the Society of Arts. They have appointed a committee to promote measures for accomplishing the reduction.

ROYAL HORTICULTURAL SOCIETY OF IRELAND. — On Thursday last the usual spring show of this society was held in the splendid gardens attached to the Exhibition Palace. The show of choice flowers, ferns, early fruits, vegetables, &c., was one of the largest and best yet held in connection with this society. The attendance was large.

MASONIC FEMALE ORPHAN SCHOOL. — On Friday evening, 16th ult., the distribution of prizes to the children of the Masonic Orphan School took place in the large Concert Hall of the Exhibition Palace. The spacious building was crowded by a brilliant and fashionable audience, and the proceedings were invested with the utmost possible eclat. The concert hall was hung round with banniers, and the front of the building was illuminated in gas jets emblematic of Masonry. The hon. secretary read the annual report, which gave a most satisfactory account of the school.

Dover House Whitehall, has been purchased by the Government, and it is not improbable that it will form part of the range of building in connection with the Horse Guards, when that department is amalgamated with the War Office.

The curious imitations of nysters lately seen in the grocers' windows have been the subject of an instructive litigation. Mr. Sparagnapane, a London confectioner, has appealed to Chancery to protect his copyright in a design for a sweetmeat, an imitation in sugar of an oyster which is affixed to and sold upon a real oyster-shell. Vice-Chancellor James held that the sweetmeat was a "design" within the meaning of the Act, and granted an injunction.

ST. BARTHOLOMEW'S, DUBLIN. — The three eastern windows of the chancel of this church have just been filled with stained glass by Messrs O'Connor, of London, in their best style. The subjects are the Sermon on the Mount, the Crucifixion, and the Resurrection. The windows are a thank offering from friends of the incumbent for the providential escape from serious accident which the clergy and choir had when a pinnacle was blown down in the gale of December 27th, and fell into the chancel during service.

TRANSPLANTING IN THE NIGHT. — A gentleman anxious to ascertain the effect of transplanting at night, instead of by day, made an experiment, with the following result: — He transplanted ten cherry-trees while in bloom, commencing at four o'clock in the afternoon and transplanting one each hour until one o'clock in the morning. Those transplanted during the daylight shed their blossoms, producing little or no fruit, while those planted in the dark maintained their conditions fully. He did the same with ten dwarf trees after the fruit was one-third grown. Those transplanted during the day shed their fruit; those transplanted during the night perfected their crop, and showed no injury from having been removed. With each of these trees he removed some earth with the roots. The incident is fully vouched for; and if a few more singular experiments produce the same result it will be a strong argument to horticulturalists, gardeners, and fruit-growers to do such work at night. — *Bow Bells*.

Shelter sheds for the protection of the troops while engaged at rifle practice on the ranges at the Curragh have been authorized, and the Secretary of State for War has ordered a board of officers to be assembled to select sites for the erection of the same.

The directors of the Limerick Masonic Hall Company, have obtained possession of the Philosophical Building. This company has been formed for the purpose of having a suitable building erected for Masonic purposes, especially for the use of Eden Lodge 73. The above magnificent structure, however, being in the market, and as nothing could be better adapted for the various requirements, it was suggested that it should be purchased. This arrangement has been happily carried out, and it is now proposed to expend several hundred pounds upon the improvement and decoration of the building.

LEAD AND RATS. — A correspondent has sent us a length of lead-piping eaten into holes by rats in a space of time as short as from Saturday till Monday. It shows that lead should not be trusted to in positions where these "varmint" get access to it. Greasy matter smeared on a pipe will occasionally induce them to eat through it; and gasfitters have a dangerous propensity sometimes thus to butter their bread for them. — *Builder*.

POST OFFICE SAVINGS BANKS. — A Parliamentary paper has been published, which shows that the sum of £5,333,638 6s. 2d. was received from depositors in the Post Office Savings Banks during the year ending on the 31st December, 1868, and the total amount standing to their credit on that date was £11,666,655 8s. 5d. The interest on the sum deposited up to the end of December was £252,897 4s. 3d. The cost of working this establishment last year was £61,860 2s. 3d.

ST. LAURENCE'S GATE, DROGHEDA. — The long talked of removal of the old house obstructing the view of St. Laurence's Gate has at length been undertaken in good earnest, and a passage will shortly be opened on the north side similar to that on the south. This tribute to historic sentiment has been so long in contemplation that we almost despaired of seeing it carried out. At the last meeting of the Corporation, however, a committee was empowered to take the necessary steps to have the obstruction removed, and the members of that committee, as became practical men, immediately engaged workmen to have it pulled down at once. We (says the local *Conservative*) feel that the town has lost something by not waiting for the "plans" and "maps" ordered by the Corporation, and the discussions upon "title" certain to follow thereon; but the loss can hardly be regarded in the light of an affliction. The first and chief result of the committee's action will be to greatly improve the aspect of a fine old monument of bygone days.

THE MEN ROCK, OR TOLMEN, RECENTLY DESTROYED. — You inserted in the *Builder* of April 10, Mr. Layard's reply in the House of Commons to the question of Sir H. Verney respecting the preservation of our ancient monuments. The concluding sentences refer to a "monument of great national value," which, he stated, had recently been destroyed in a Vandalish manner. It may interest your readers to know that the relic of antiquity of which Mr. Layard spoke was the Mén Rock, or Tolmèn, in Western Cornwall, about 3½ miles south-west of Penryn. The Mén Rock was one of those designated by Borlase as tolmen's or holed rocks. Two of a

similar character occur in the island of St. Mary, Sicily, but these are not of such a curious formation as was the recently-displaced Tolmèn, in Constantine parish. Situated on high ground, this latter rock was such a prominent and interesting feature, both from its position and from its huge size, that it could not fail to be noticed even by a stranger to the locality. Borlase states that at least 750 tons of granite were contained in the stone itself, but I believe this estimation to be a rather exaggerated one, and a value probably nearer the truth would be about 500 tons. Even this is an immense weight to rest simply on the points of two rocks several feet apart; and, more remarkable still, beneath the huge stone there was an open passage large enough for a full-grown person to creep through without much difficulty or exertion. The length of the stone, which was oval in form, was about 33 ft., decreasing in width from 19 ft. in the middle to 18 ft. and 16 ft. at the north and south ends respectively. Its circumference measured approximately 100 ft. The passage beneath the stone was about 3 ft. square, and, through this, it has been customary among the ignorant and superstitious to pass men, women, and infants to cure them of lumbago and all spinal complaints. I have been unable to ascertain the exact date of the overthrow of the Mén Rock; but it probably occurred some time during the second week in March last. The deed was done, I believe, without the knowledge of the proprietor of the ground, by a man to whom he had let the adjoining quarry, and to whose discredit and shame belongs, therefore, the blowing up by gunpowder of the bed of granite on which the stone lay. When shall we have our pre-historic remains, all of which are so valuable in elucidating the history of an ancient race, preserved from further mutilation and destruction? — *Builder*.

SCIENCE AND ART. — A striking instance of the immense value a small piece of steel may acquire by the great power of skilled mechanical labour is the balance-spring of a watch. From its extreme fineness and delicacy 4,000 weigh not more than one ounce, and exceed in value £1,000. A most interesting little work, describing the rise and progress of watch-making, has been published by J. W. Benson, 25, Old Bond Street, and the City Steam Factory, 58 and 60, Ludgate Hill. The book, which is profusely illustrated, gives a full description of the various kinds of watches and clocks, with their prices. Mr. Benson (who holds the appointment to the Prince of Wales) has also published a pamphlet on Artistic Gold Jewellery, illustrated with the most beautiful designs of Bracelets, Brooches, Earrings, Lockets, &c., &c., suitable for Wedding, Birthday, and other presents. These pamphlets are sent post free for two stamps each, and they cannot be too strongly recommended to those contemplating a purchase, especially to residents in the country or abroad, who are thus enabled to select any article they may require, and have it forwarded with perfect safety.

TENDERS.

Tenders for New Female Probationary Ward, Cork Union Workhouse; Mr. Richard R. Brash, M.R.I.A., architect. Opened by the guardians, April 15th: —

James Hunter	..	..	..	..	£2,530
Robert Walker	..	..	..	..	2,300
Thomas E. Walsh	..	..	..	..	2,275
Patrick Barry	..	..	..	..	2,210
Richard Evans	..	..	..	..	2,060
Terence O'Flynn	..	..	..	..	1,890
Richard Longfield	..	..	..	..	1,884
Simon Kenefick	..	..	..	..	1,663

Tenders referred to special committee. Architect's estimate, £1,850.

INSOLVENTS.

William Brown, Digges-street, Dublin, carpenter.
Andrew Jackson, Relay, Co. Cavan, road contractor.
James Dodd Askins, late of Park-avenue, Sandymount, Co. Dublin, commission agent, having had offices in Westmoreland-street, Middle Abbey-street, Molesworth-street, Fleet-st., Kildare-street, &c., all in the city of Dublin, sued and arrested as James D. Askins.

TO CORRESPONDENTS.

The report of the "Historical and Archaeological Association of Ireland" was not received in time for insertion in present issue.

J. T., Limerick — Your paper savours too much of a political character. We must refuse its insertion in our pages. Try another subject.

The Proprietor of the IRISH BUILDER requests that all parties who have been furnished with accounts from the office will send the amounts of same immediately. P. O. Orders should be made payable to Mr. PETER ROE.

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TESTIMONIALS.

From **WILLIAM TITE, Esq., M.P. for Bath, and Architect of the Royal Exchange, London.**
 House of Commons, 2nd March, 1864.

DEAR SIR,—In reply to your note, I beg to say that I have used both the sorts of Cement manufactured by your firm, and that of Messrs. Francis and Son; I mean the Cement usually called Roman Cement, or the more recent introduction of Portland Cement. I believe these Cements, manufactured by either of your firms, to be equally good. I know no difference, chemically or practically, between them; and I should use, and authorize to be used indifferently, either one or the other. You are at liberty to use this note, if you think it necessary.—I am, Dear Sir, your obedient servant,
 Messrs. White & Son. (Signed) **WILLIAM TITE.**

From **R. O. MINNIE, Esq., Surveyor to Board of Ordnance, London.**
 War Office, Pall Mall, London, S.W.,
 3rd March, 1864.

GENTLEMEN,—In reply to your request, I have much pleasure in stating my favourable opinion of the quality of your Portland and other Cements, which have been extensively used in the Public Works connected with the War Department at home and abroad, especially in several of the fortifications now being erected in this country. On all occasions within my knowledge the quality has been equal to that of any other manufacturer, and has given great satisfaction.—I am, gentlemen, your obedient servant,
 (Signed) **R. O. MINNIE, Surveyor.**

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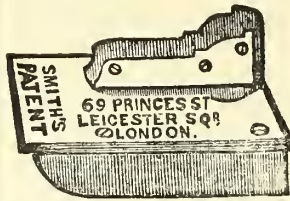
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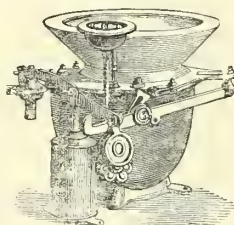
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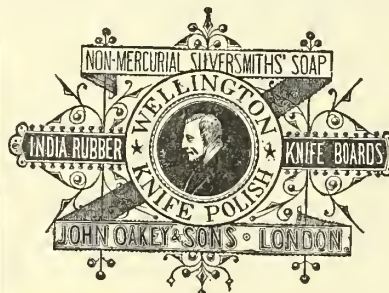
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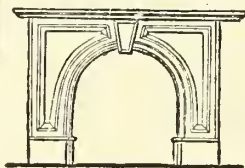
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The Irish Builder.

VOL. XI.—No. 226.

The "O'Connell" Tomb in Glasnevin Cemetery.



THE tomb in which, twenty-two years ago, the remains of our illustrious fellow-countryman, "O'CONNELL," were laid, having been found in an unsatisfactory state from the dampness of the ground in which it was placed, and its condition, with paltry and flimsy decoration, in every way unworthy of the noble dead, the Cemeteries Committee resolved, with the sanction of the surviving members of the family, on removing the coffin to the crypt at foot of the Round Tower in the Cemetery. They also decided on providing out of their funds a suitable and permanent receptacle for the remains, and for this purpose they engaged the services of our fellow-citizens, Messrs. Earley and Powells, Camden-street. For the manner in which these gentlemen have carried out the wishes of the Committee we must refer to the work itself as now completed and fixed in the Cemetery.

To that excellent authority on all subjects connected with Irish Art—the late George Petrie—reference was chiefly made for the examples of ornamentation suitable for the peculiar class of work that was required to be produced by the sculptors engaged. The design consists of an altar-shaped tomb, 9 ft. long, 4 ft. wide, and 3 ft. high. On either side are three sunk and pierced panels; one end contains the arms of the O'Connell family in a carved panel, while the other end comprises a sunk and carved panel same as those on sides. The coffin is visible through the trefoil openings in panels. In front of each panel rises a semicircular arch with base, shaft, and capital, the soffits being elaborately carved, from the purest Celtic examples. A fillet runs round the outer surface of each arch, forming a spandril slightly sunk, and filled with interlaced serpents. The bases, round on plan, represent coiled serpents. The capitals, also round on plan, are filled in between the collar-mould and abacus with beautiful interlaced ornaments of various designs and treatment—the ancient Irish character being carefully preserved. The abacus of each capital is studded with what are usually known as bolt-heads. The angles of the tomb are rounded and slightly sunk, having carved interlaced designs; the square form both at the plinth and under the plate being maintained. The table, formed of one slab of Kilkenny marble, projects slightly over the face of substructure; it is moulded, and sunk to receive brass inscription plates; the centre of slab contains an incised Irish cross. The substructure is composed of stone from the Coolcullen quarry.

Amongst other work executed in connexion with the tomb may be noticed the following:—In head of doorway leading from crypt into basement chamber of tower is a tympanum of stone carved with the subjects—"Our Blessed Lord Crucified;" "the Blessed

Virgin and S. Paul at the foot of the Cross." Underneath this tympanum there is a well-designed grille of wrought iron work, painted and gilt. From the walls of crypt are suspended four banners, with characteristic emblems and inscriptions, and over the entrance is the following:—

"MY BODY TO IRELAND.

MY HEART TO ROME.

MY SOUL TO HEAVEN."

On yesterday a religious ceremonial took place on the occasion of the removal of the remains to their final resting-place. The outer coffin, brought from Genoa in 1847, was found to be so much impaired that a new one of massive Irish oak had to be supplied. The old silver mountings and plate were in good condition, and have been retained. The following is the inscription on the plate:—

DANIEL O'CONNELL,

HIBERNÆ LIBERATOR,

AD LIMINA APOSTOLORUM PERGENS,

DIE XV. MAI, MDCCCLXVII,

GENOÆ OBDOXIMVIT IN DOMINO,

ANNOS NATUS SEPTUAGINTA TRES,

R. I. P.

An evening contemporary calculates that there were at least fifty thousand persons present to do honour to the memory of him so dearly loved by the people. After the celebration of Pontifical High Mass for the Dead, an oration was delivered by the Rev. Father Burke, and the proceedings were brought to a close.

THE ROYAL ACADEMY.*

THE one hundred and first anniversary of the exhibition of the Royal Academy has been celebrated under most auspicious circumstances. With a selection of pictures far above the average, coupled with a magnificent building and a beautiful light, it would have been surprising indeed, if the experiment had not been successful. The splendour of the new rooms may have, and no doubt has had a great deal to do with the success, but it is almost impossible to disguise the fact that the collection is of more than usual excellence. Of the building itself, there can be but one opinion; not only does it possess marked advantages over the old gallery as regards light and accommodation, but the painters themselves are greatly the gainers, inasmuch as the pictures are better hung, and the rejections fewer; yet even in this collection the number of works sent in has been so unusually numerous, that where one picture has been accepted, three it is said have been rejected. The plan of the new building is a parallelogram, the central part being devoted to sculpture. The roof is very lofty, and richly gilded, and in niches are placed the busts of illustrious painters. On the right of the hall is the lecture-room, and to the left a large apartment, the most commodious of the suite. In a line with the central hall and vestibule, the statuary finds refuge in an appropriate room. The remaining sides of the parallelogram are occupied by eight chambers, the lighting of each of which is from the top, and perfect of the kind; the decorations are rich, but not gorgeous; the walls are coloured with a chocolate tint, and the wainscot is of a walnut hue. The floors are parqued in oak and other woods, and the arches as well as the panels of the doorways are of highly polished marble. None of the pictures are hung below the eye, or more than three deep, and as luxuriously cushioned couches are plentifully strewn around the rooms, little else beyond good paintings, to complete an intellectual feast, is required. The collection itself is, as we have already remarked, above the average, and the most noted of the academicians are well represented—Sir Edwin Landseer is in

great force, as is also Sir Francis Grant, the President of the Academy. Then the pencils of Daniel Maclise, Frith, Jones, Millais, Cope, Ward, Poole, Calderon, Watts, Herbert, and Knight, are especially conspicuous, while, among the associates, Armitage is as usual in the front rank, and in the general body the names of Faed, Redgrave, Cooper, Nooke, Frost, Marcus Stone, Cooke, and many others, find an especial welcome and prominent places.

Sir Francis Grant's picture represents the "Belvoir Hunt" (143) most cleverly and effectively drawn, and on each side of the doorway of the first room are Sir Edwin Landseer's "Lions" (30 and 32). Of course, no one can paint a lion like Sir Edwin, and these are fine studies, almost life-size; yet many will prefer his "Swannery attacked by Eagles" (120), which is a noble work, and occupies the centre-place in the front room. The picture is terrible in its intensity, in the fierce conflict between the birds, one of them having his wing broken by a blow from the swan. The landscape also is magnificent, and is in perfect keeping, and the colouring of the painting is remarkable for breadth and harmony. In the glimpse there is of "Princess Elizabeth being Compelled to attend Mass by her Sister Mary," Mr. Marcus Stone has done himself infinite credit. It is perhaps the best and most effective picture this artist has painted; his conceptions are generally clear and brilliant, but his hand has not lately yielded him perfect obedience. The sisters sit side by side in a little chapel—Elizabeth with an ill-concealed scorn and impatience that would be plainly visible to Mary, if Mary did but only turn her gaze from the altar, which is clearly the object of her passionate devotion. The faces are good likenesses, and full of character; the figure of Elizabeth in her white stiff dress is well drawn and happily conceived, and the characteristic expression given to every head is excellent. We are not quite sure that Mr. Cope has been so successful as usual in his choice of subject, "The Price of Victory." It represents the Duke of Wellington in bed on the morning after Waterloo. Dr. Hume announces the deaths of Sir Alexander Gordon and many other brave soldiers; the Iron Duke is evidently moved, but the incident is scarcely one for pictorial representation, and has not been treated with skill; the result is displeasing and wholly unsatisfactory, notwithstanding vast pains must have been taken in the painting. It, in fact, intends to touch the spectator much in the same manner as the Duke is touched, but it falls far short of its meaning. Mr. Faed's "Homeless" (73) is altogether a work of different construction, and is one of those peculiar and remarkable studies of picturesque rags which the artist has made entirely his own. A crossingsweeper, hugging his broom, has dropped asleep in a doorway; and a new illustration of the truth of the famous clothes-philosophy is to be found in him, for, as Mr. Faed has treated him, the rags are in fact the boy. The effect is a little too exclusively obtained by the wonderful process of patchwork, but nevertheless it is a fine picture, full of meaning and effect. No. 82 is from Mr. Frith's pencil, and bears the title of "Hope and Fear." It is in a double compartment; the first is understood to represent a young man confiding his "hopes" matrimonial, to a gentleman of whom he evidently hopes to be the son-in-law; in the second compartment the young lady upon whom these "hopes" are built is indulging in "fears," and appears to be comforted by an elderly lady. Perhaps no painting in the exhibition has had so much care bestowed upon it with so little apparent benefit. In the same gallery is the "Gambler's Wife" (104), exquisitely painted by Millais. The poor lady has been sitting up all night in her sleeping-room, while her husband and his friends have been gambling until daylight in an adjoining chamber. At daybreak, the candles are in their sockets and the cards on the table, yet the lady is patient. Clever as the subject is handled by Mr. Frith, we prefer

* From the Broad Arrow.

his "Altsidora's pretence of love for Don Quixote" (123), which is unquestionably the most satisfactory in all respects of the four works contributed by this artist. In colour it is magnificent and absolutely faultless. In "King Cophetua and the Beggar Maid" (171), by Daniel Maclise, we have a highly-finished and entertaining work, completed with all the minute carefulness special to this artist, and which fully sustains his well-earned reputation. In an adjoining room the eye can scarcely fail to dwell upon a finely executed sketch, specially painted for the Garrick Club by O'Neil; it will interest many who care to see what authors and painters, Members of Parliament and men in the army—for the whole are recognisable portraits—are like. The club is in its shirt-sleeves, in the billiard-room, watching a game at pool, and apparently so pressed for space that it has for the time been compelled to suspend its standing rule of leaning on the table. The portraits are for the most part executed with great care and fidelity. The Garrick Club is a fortunate and appropriate possessor of such a painting.

We scarcely can give unreserved compliment to Sir Francis Grant's large picture of the late Sir Hew Ross (83), although it has decided merit, nor can we give unqualified approval to Mr. Watt's "Return of the Dove" (45). It occupies a small space under the "Price of Victory," and is simple almost to insignificance, but there is a "wide waste of unknown waters" far from being highly finished, and the dove is too minute to be faithful. Mr. Pettie, a rising artist, scarcely pleases us in his "Disgrace of Cardinal Wolsey" (130). The bald head of the courtier is badly foreshortened, and the likeness of Cardinal Wolsey very different to that we have been accustomed to. What can possibly also be the meaning of Mr. W. H. Hunt's "Birthday" (106), in room No. 3? It represents a portrait of a lady of an uncertain age, not particularly pretty, with a cape of feathers over the shoulder. Well, as a portrait, it may possibly pass muster; but it has little else to recommend it. It is pleasant to turn to a nicely-painted picture by a young aspirant for fame, Mr. Richmond, a son of the Academician. It is, we believe, his first work, and vividly recalls in its form and subject of a procession the earlier work of Mr. Leighton. It resembles, too, that painter's picture of the "Brides of Syracuse," exhibited three years ago, and is of equally good promise. In Mr. Leighton's "St. Jerome," by-the-bye, we have a good example set of fine painting, which is altogether a striking picture, most deliciously coloured—as, indeed, are all this artist's works—and there are two other pictures from the same pencil in the exhibition which are equally commendable for good taste and expression. We had almost forgotten to call attention to a singularly chaste specimen by Mr. Cope (115), entitled "The Domestic Chaplain," which portrays a little boy in an arm-chair reading prayers to his mother, who is, apparently, ill in bed. Unpretending in character, it is one of the best executed pictures in the gallery. In No. 7 room there are several eminent contributions by foreign artists, and one of the most noticeable pictures in this gallery is "A Christening in France," by M. Legros. It is a painting of remarkable merit and of inexpressible delicacy. Did space allow, we might give an analysis of other clever works by accomplished masters. It must, at present, suffice to record that Mr. Tadema and Mr. Daubigny are among the number of foreign artists of known fame who have contributed to this year's Exhibition.

Taken as a whole, a better collection could scarcely be expected or desired. The majority of the paintings are decidedly of a high class, and few, very few, below the average. They all have, too, the advantage of better light and more careful hanging, points which all artists must profit by. The building, although not quite finished, is altogether a success, and the principal gallery makes a magnificent appearance with Landseer's "Eagles" on one side, in close company with choice works by Frith, Hook, Watts, and

Millais. Opposite is Maclise, with his colossal picture of "King Cophetua and the Beggar Maid," and the portraits of the Duchess of Athole and the Duke of Edinburgh, while, holding subordinate but not less noticeable places on either side, are exquisite landscapes from the pencils of Creswick and of Lee. The fitting of the Royal Academy from Trafalgar-square to Burlington House has been attended with benefit both to exhibitors and to the public; and when a few trifling drawbacks, inseparable from the beginning of a new era, have been remedied, we shall be able to boast of a picture gallery which will bear comparison with that of any other country in Europe.

BOOKS RECEIVED.

Christ Church Cathedral. By the Rev. Edward Seymour, M.A., Prebendary of S. Michael's. Dublin: Hodges, Foster, and Co.

THE above work has just been issued. The short period intervening between the receipt of a copy and our time of going to press precludes our noticing it at length in present number. In his preface the author states that it "cannot claim to be much more than a compilation from other works, and where it is so I have preferred as far as possible to give the writer's own words in full: sufficient however of fresh matter (in addition to the general arrangement of the various pre-existing materials) will be found to redeem it from the charge of want of originality. In it will be given for the first time an accurate account of the architectural features of this ancient fabric; and, with the advantage derived from Mr. Street's researches, this portion of the work may claim to be regarded as the first effort to illustrate the history of the Cathedral from this important and trustworthy source of information." The reverend author has done well in collecting together and giving to the world the scattered historical fragments of this ancient pile. We are sure his work will be eagerly sought for and carefully perused by every ecclesiologist and antiquarian.

The Smoke Nuisance, and its Remedy, with Remarks on Liquid Fuel. By C. J. Richardson, Architect, Consulting Engineer for the Warming and Ventilation of Buildings. London: Atchley and Co.

In this pamphlet of fifty pages the author brings forward in a very concise manner the various methods which have been tried for the remedy of Smoke Nuisance in the "Great Metropolis," with its 400,000 houses, and 2,000,000 chimneys! "The only wonder (says Mr. Richardson) is that the atmosphere of London should be so pure and fresh as it is. The black mist cannot be considered, however, altogether as an evil; it at least makes good for trade, and that to an enormous extent. It benefits all the architects and builders in the first place, by the continual erection of houses; likewise the lawyers, in preparing leases and mortgages; it entirely supports the omnibus traffic; and is of material assistance to the railroads, and all the thousands of tradesmen who sell soap, candles, dress, ironmongery, &c." The plan proposed by the writer is, to pass the smoke through a water-spray. It will be best explained in his own words as given on page 16, and accompanied by an illustration representing "a section of a small stove, with its flue experimented upon to ascertain the worth of the water-spray process. The lower part of the stove is of brick, the upper part, with the cistern, is of zinc. The coal fire was lighted, and as soon as dark smoke appeared at the chimney top, the water-valve was lifted, and about 16 fine jets of water were sprayed against a piece of loose perforated zinc, suspended in the flue; the smoke had to turn towards the water, and to pass through it to get to the flue above. On the instant the water was applied, the smoke appeared at the chimney top of a light colour, and it came out at the soot receptacle nearly as much as it did at the top, and of a similar light vapourish

character—a sure sign that it was drawn down by the current of water. Soot in a large quantity was soon seen in the receptacle; two small pieces of glass were placed in the flue, that the operation of the water might be observed. The stove was kept in action at various times for a few months, and always with the same result. If the descending soot-flue had been 30 or 40 feet in length instead of only 4 or 5, less vapour would have escaped below; it was evident that the operation purified the smoke. The adaptation of this simple contrivance to any kind of the domestic chimney-flue is not a very difficult operation." We would not be over sanguine as to the results of the "water-cure,"—perhaps some of our readers might give it a trial.

The Journal of the Historical and Archaeological Association of Ireland. Vol. I., part 4.

WE cannot find time just now to do more than acknowledge the receipt of the above from the esteemed Hon. Sec. It appears to be got up in its usual good style, and contains a number of illustrations. On the cover of this part there appears the announcement that "The 'Annual Volume' of the Association for 1869 will consist of the first part of an exhaustive descriptive work on the Round Towers of Ireland."

Falconer's Railway Guide, price 3d.; and *Falconer's Official Pocket Guide*, price 1d. Dublin: John Falconer.

WE are glad to notice a marked improvement in those "Guides." The "Topographical Information," which extends over several pages, will be found of great service to tourists. The summary of the public edifices and places of interest in Dublin is well arranged, and although printed in very small type, is very readable. These books should command a large sale at the present season.

THE "HEVEY" TESTIMONIAL.

WE have to state that progress in the matter of the above testimonial has been delayed in consequence of the unavoidable absence from home of the principal party who undertook to carry it through. The subscription list will be kept open for a few days longer; in the meantime arrangements will, it is expected, be made as to the nature of the *souvenir*, and also as to the time of its presentation, of which the subscribers will be duly advised. Those amongst Mr. Hevey's friends and admirers who may not have been waited upon, will kindly forward their subscriptions to our office soon as possible.

WICKLOW HARBOUR.

AT the presentment sessions for the County Wicklow, held on Tuesday last in the Court-house, Wicklow, the sum of £2,000 was voted for the construction of a draw-bridge on the present stone bridge, so that vessels might moor higher up the river; and also for the deepening of the river bed and building quay walls. The above improvements will be of immense benefit to the trade of the port of Wicklow. The works will be carried out under the direction of Mr. Henry Brett, C.E., the County Surveyor.

SCULPTURE COMPETITION.

THE town of Leyden invites the sculptors of all countries to send in models for a statue of Boerhaave in the costume of a professor of Leyden University. The models are to be 3 ft. 3 in. (a metre) in height, including the statue and the pedestal. The author of the selected model will have to execute a plaster copy of his design, from three to four metres in height without the pedestal. The statue will be in bronze. The 1st of September, 1869, is the latest day for receiving models, and M. Boogaard, Professor to the University of Leyden, will furnish further information.

A SUGGESTION FOR THE SANITARY IMPROVEMENT OF TOWNS AND DWELLINGS.*

SANITARY Science is a subject of such acknowledged importance that it scarcely seems necessary to offer an apology for any observation or suggestion, however humble, which may tend at once to point out a defect in the arrangements which modern civilization has adopted in the furtherance of sanitary security, and to indicate an easy and effective means of obviating that defect.

It will be conceded on all hands that a vitiated and impure atmosphere exercises a pernicious effect on the health of all members of the human family living within the precincts of its influence. The comparatively unhealthy and prematurely aged aspect of the citizen, contrasted with the robust and hale appearance of the peasant of equal age is a familiar fact. That this is owing to the effects of the more impure atmosphere in which the denizen of the city spends his life, would appear to be established by the consideration that while the citizen usually enjoys the advantage of a better dietary, the peasant, even when dependent on the poorest and most inadequate diet, far exceeds him in vigour and healthiness of aspect, the purity of the atmosphere which the latter breathes proving manifestly more than an equivalent for good diet with bad air.

Among the means which civilization has introduced for the purpose of purifying the atmosphere of our towns and dwellings, none is more familiar or important than the sewer. Its object plainly is to carry out of sight offensive matter, and to confine and imprison gases resulting from decomposition, which not only offend the senses, but which were long since observed to be deleterious to health. The inhabitants of crowded districts, where the sewerage is insufficient, or ill-conceived, and where the atmosphere is deeply impregnated with the gases extricated by the decomposition of organised matter, too plainly bespeak, by their wan and cachectic appearance, the deadly influence of some pernicious agent; and on the outbreak of any epidemic, whether cholera or typhus, small-pox or scarlatina, erysipelas, or malignant exanthem of any class, it is but too notorious, not only how much the spread of the disease has been promoted, but how much its malignity has been increased by the presence of bad sewerage; for, although it cannot be pretended that the gases of decomposition constitute the essence of zymotic or epidemic disease, it cannot be denied by any practical observer that they assist and contribute, in some inexplicable manner, to the spread and propagation of such diseases, while under ordinary circumstances they exercise a deteriorating influence on the health of those subjected to their effects.

The deficiency of the covered sewer, and the inconvenience and danger arising from the escape of the sewer gases, which had become only more concentrated and more powerful by their accumulation and temporary imprisonment, soon became apparent, and the expedient of trapping the apertures of the sewer, both where they open in the street channels and also in the sculleries and areas of private dwellings, was adopted as a preventive of the bad consequences following on the escape of sewer-gas.

The fact seems to have been overlooked that in merely trapping the higher apertures of the sewers the dangers resulting from the imprisonment of the sewer gases were positively increased, and that, in order that the trapping might fulfil the intention with which it was adopted, another and further precaution was necessary, which has been almost altogether neglected, and most of all so where the danger appears to be greatest and most urgent.

I was led to this conclusion by the consideration of two facts. The great object in all sewers is to have a fall, and consequently

the inclination of the sewer more or less is downwards towards its mouth. But the tendency of the sewer-gas, in consequence of its volatility, is to ascend; and hence follow most important results.

If the sewers be not trapped, the gases escape from the highest apertures, intended for the admission of surface drainage, or domestic offal. The passer-by is, perhaps, offended by the unsavory emanation, or, in time of pestilence or epidemic, peradventure the noxious effluvia acts the part of ally to the prevalent disease, and he sickens ere he arrives at his dwelling; while, of that gas which makes its escape in the untrapped area or scullery of the private dwelling, a part probably finds its way into the lower regions of the house, to rise from thence to the upper storeys, while a part becomes diffused in the surrounding atmosphere.

Let us now consider the results which follow, when the sewers are trapped, according to the present system, which makes no provision for the ascent of the sewer-gases, their cumulative tendency, their volatility and diffusibility, or the inevitable consequences of any pressure or obstruction occurring at the orifice of exit from the main sewer.

It is now an established fact that the sewer-gases ascend in currents, opposite in their direction to the flow of the contained water and denser materials, which gravitate towards the sewer's mouth. This might naturally be expected, but it has been positively ascertained by a series of experiments undertaken by Mr. Bazalgette, Engineer to the Corporation of London, who, by their desire, instituted these experiments for the purpose of deciding this point, and found the currents of the sewer-gases directly opposite to that of the descending fluids.*

This being the case, and the street gratings being trapped, the gases necessarily find their way from the street mains into the branches leading to private houses, and escape into the area or scullery, if untrapped; but if they are trapped, no resource remains but to ascend the down-pipes of the water-closets, which are too often in the body of the house, and here they are temporarily arrested.

It is not difficult to show that the arrest here is only temporary. The gases being cumulative, and their tendency being to ascend as they increase in quantity, the pressure on the gas, which has attained the highest point, must increase. In the water-closet, the escape upwards of the sewer-gas is prevented only by the water in the trap.† But, water being capable of absorbing gases to some extent, a slow, insensible process is constantly going on, by which the gas absorbed by the water in the trap is given off within the closet, and, mixing with the atmosphere of that chamber, must not only vitiate it, but become diffused more or less through the atmosphere of the dwelling.

It is to this circumstance, conjoined with the impossibility of making any plumber's work so staunch as to completely prevent the escape of these volatile and attenuated agents (which we know will permeate crevices that water could not pass through) that we are to attribute the heavy, mawkish, oppressive smell which is to be met with in the best constructed and most approved water-closets of the day.

In the case of our street sewers a somewhat similar process must occur—pressure from like causes must take place upon the roofs and sides of the sewer, and the gases escape

through cracks and rat-holes with which all sewers abound. They first become diffused through the superincumbent clay, and, rising to the surface, soon meet the lower strata of the air, from whence it is not difficult to foresee their easy transfer to the lungs of the passer-by.

Thus, the atmosphere of our streets becomes vitiated by the leakage of the gases from the mains, while that within our houses is poisoned by the escape from the house sewers, the soil-pipe of the water-closet in particular. It is a mistake to suppose that these mephitic gases find their exit at the mouth of the main sewer, far away from our houses. It is an ascertained and established fact, as already mentioned, that they rise in the sewers, in a direction contrary to the current of the fluid contents, finding their way to the highest levels, from whence they must find vent somewhere, and can escape only in the manner already indicated.

These conclusions were more particularly forced upon me by the observation of phenomena of frequent occurrence in the town where I reside. The houses in one of the best streets, which stand on an incline, at a considerable elevation above the river, and at a considerable distance from it, are liable to become very remarkably foul and oppressive during the prevalence of high winds, which might naturally be expected to ventilate and purify the atmosphere. The circumstance appeared unaccountable until it was observed that the inconvenience, which always bears direct proportion to the force of the storm, is produced only by such winds as bear more or less directly on the mouth of the main sewer. The mystery was now solved, and a clear explanation of the circumstances afforded. The pressure exercised by the wind driving up the sewer plainly forced the gases into the houses.

The inferences to be derived from this observation received further confirmation from a circumstance which occurred in one of the houses in question. The proprietor was greatly annoyed by the escape of foul gas from an open grating placed adjacent to the jam of the back door; but no sooner had he taken the precaution of having this grating trapped than the atmosphere within the house became palpably more impure than ever, and this was the more apparent in proportion as the wind blew more or less forcibly on the mouth of the main sewer, which empties itself into the River Nore, far away from the house which was thus affected. (In this case the house-sewers pass under and across the house to reach the street main sewer.)

The significance of this fact seems to admit of no doubt or controversy, and it can scarcely be questioned that the same phenomena are constantly going on in every town in which the covered sewers are constructed on the present plan, the only difference being merely one of degree.

L A W.

COURT OF COMMON PLEAS.

Taylor v. Hall.—This was an action brought by plaintiff, Mr. Thomas Taylor, a building surveyor, whose office is at 5, D'Olier-street, against defendants, Messrs. Hall and Son, builders, carrying on business in Harcourt-street, to recover a sum of £45 3s. 9d. for work and labour in the making out of certain quantities required by defendants in order to enable them to make a tender for certain works which were to be completed for John Walsh, Esq., at Dundrum Castle, according to plans and specification prepared by Mr. William Fogerty, architect. Plaintiff's case was that the tender of Messrs. Hall and Son, which was based on his calculation of the amount of material required, was accepted, and that they agreed, and that it was the custom of the trade for the successful contractor to pay the building surveyor for making the requisite calculations. The defendants traversed the causes of action. The jury found for plaintiff for amount claimed, with costs.

* By Zachariah Johnson, A.M., T.C.D., F.R.C.S., Licentiate of the Royal College of Physicians, Dublin; Surgeon, Kilkenney Co. Infirmary. Extracted from the *Medical Press and Circular* of 21st ult.

* For an account of the experiments instituted by Mr. Bazalgette, in order to determine this point, the reader is referred to his report on the subject made to the Corporation of London, by their desire, and which has been printed, and can be had through any bookseller.

† It may be necessary to explain that there are two forms of trap in use in water-closets, but the argument applies equally to each. They are called respectively the D trap and the S trap. The latter, or S trap, is the most approved, and that now most in use. The principle in each is the same. The foul gases from the soil-pipe are arrested in their course upward by water, so disposed that the gas must descend through this water in order to reach the apartment on the other side of the trap. This it cannot do immediately (in the way we see air or the lighter gases ascend in bubbles through water, oil, and other fluids), but it does so slowly, by absorption and subsequent gradual evolution. The peculiar mawkish and oppressive effluvia perceptible in the best trapped and most perfect water-closets must be familiar to every one, and is in itself sufficient proof of this.

HISTORICAL AND ARCHÆOLOGICAL ASSOCIATION OF IRELAND.

THE quarterly meeting of this Association was held at Butler House, Kilkenny, on Wednesday, the 21st ult.

The Rev. W. C. GORMAN in the chair.

Twenty-four new members were elected, as follows:—The Right Hon. the Earl of Inchiquin; the O'Connor Don; the Very Rev. Monsignor Moran, D.D.; Samuel Ferguson, LL.D., Q.C., M.R.I.A., Deputy Keeper of the Records, Ireland; Arthur Wynne Foot, M.D.; Samuel P. Close; Ed. Nixon; J. Esmond; James B. Murtagh; Daniel Birmingham; Matthew Doyle; the Belfast Library; and the Science and Art Department, South Kensington, London; Rees Stephen Jones, C.E.; W. Steele; William Henderson; the Hon. M. J. French, R.M.; William Valentine; Joseph Bell; William Fitzgerald; Laurence Doyle; Robert W. Symes; Joshua Clarke, Q.C.; Patrick Horgan.

PRESENTATIONS.

A number of books, presented to the library, were laid upon the table. Amongst them two were particularly remarkable, viz., the magnificent work on the "Runic Monuments of Slavonia and England," by Professor George Stephens, of Copenhagen; and "Holy Cross Abbey," by Samuel P. Close, A.R.I.A.I.—a beautiful publication, which does the utmost credit to the professional skill and artistic taste and ability of that gentleman.

Mr. Prim, on the part of Mr. John M'Donald, of Castlewarren, presented to the museum a bronze celt, found last January at a depth of 2½ feet from the surface, in making drains on Mr. M'Donald's farm; a stone celt, found also on his farm at about 8 inches below the surface some twelve or fourteen years since; and a small horn of a cow (the original Irish cow was a short-horn), being one of about two dozen similar objects which had been found a few years since, in Coolcullen turf bog, on Mr. Diamond's land, on the marl beneath 16 or 17 spits or sods of the peat.

Captain William Lyster presented a black-letter prayer-book, of which the title-page was wanting, but it was of the reign of Charles II.

Mr. Bracken, on the part of Constable Kirwan, presented a penny token, struck during the period of the Commonwealth of England, by John Whittle, a Cromwellian settler in Kilkenny. It was found by the constable in his garden in Mandlin-street, and was in excellent preservation.

Mr. Hodder Westropp, Cork, exhibited an antique brooch, of gilt bronze, found in the King's County, and intimated that he would defray the cost of having it engraved for the Association's "Journal."

The Rev. Richard E. Baillie presented drawings of a curious stone hatchet, found in a bog in the parish of Muff, Co. Derry; and of a stone 7 feet high by 4 feet wide and 2½ feet thick, engraved on the face with fifteen consecutive circles, 7 inches in diameter, and having a hole in the centre tapering inside to a point. This stone is situated in the same neighbourhood, and is known in the locality as "The Druid's Stone."

STATE PROTECTION FOR ANCIENT MONUMENTS.

Mr. Graves called attention to the recent declaration of Mr. Layard in the House of Commons, as to his intention of making some movement for securing State protection for ancient monuments in England. The hon. secretaries of the Association had deemed it proper at once to take steps towards endeavouring to have Irish Monuments brought within the influence of any measure of the kind which Mr. Layard might contemplate. Communications had accordingly been addressed by them to Mr. Layard, to Mr. Chester Fortescue, the Chief Secretary for Ireland, and the Hon. L. Agar Ellis, M.P. It would have been seen that on Monday Mr. Ellis had interrogated Mr. Layard in the House of Commons as to whether he intended including the Irish Monuments amongst those which he proposed the State should take

under its supervision; and the answer—although a difficulty of a routine nature had been suggested—on the whole was favorable. It appeared from Mr. Layard's reply that Lord Talbot de Malahide and others had also written to him on the same subject; and it was to be hoped that the Irish representatives would not lose sight of the matter, but exert themselves for the suitable extension to Irish National Monuments of any such measure which might be brought forward.

THE TOWER OF ST. FRANCIS' ABBEY.

Mr. Graves continued to say that, pending the intervention of the State—if indeed they might hope it would intervene for the protection of ancient monuments in this country—they should exert themselves to keep such monuments from destruction wherever they could do so. Last year they had, by means of a special subscription, obtained the means of supporting the tower of St. Francis' Abbey, which had been in a most dangerous condition, with cast iron pillars. But if they were not enabled to repair the hanch of the tower before next winter, what had been already done would go for very little. From £20 to £30 more would do all that was necessary, there being a balance of £7 or £8 still in hands.

ANCIENT IRISH BELL.

The Rev. Philip Moore, P.P., Johnstown, wrote to inform the Association of the fact of Gorges Hely, Esq., Foulks-court, having in his possession a very fine specimen of an old Irish ecclesiastical bell, found on the site of an ancient well, it having been discovered by a workman engaged in enlarging a fishpond, midway between Foulks-court Castle and the neighbouring old church—buildings which were evidently coeval, dating about the year 1400. The bell, as far as his observation went, was of iron, covered over with fine bronze, and riveted together at the sides. It had a handle, to be used in ringing it, and there was an iron bar inside upon which apparently the tongue had been suspended. When struck it emits a fine clear sound, although it is a good deal corroded by the action of the water. Mr. Hely seemed to prize the relic very much, but would have no objection to send it to a meeting of the Association for inspection. He said there was a tradition in the locality that the bell had belonged to the old church, and was hidden in Cromwell's time.

DISCOVERIES AT THE BLACK ABBEY.

Mr. Prim informed the meeting of the discovery of a very handsome flamboyant window in a wall of what had been the domestic portion of the Black Abbey buildings in the olden time. Mr. James Sullivan, jun., having occasion to fit up a cooper's workshop at his malting-house at Friar's-bridge, on the site of the old Dominican Abbey premises, directed a mason to break out a window in the wall bounded by the Bregach river. The mason went to work to make a breach for the purpose, but soon found indications of a window having existed there before, and he very properly proceeded cautiously with the operation, and brought to light this fine flamboyant window, which had opened on the river from what may probably have originally been the refectory of the abbey. The mullions and tracery were quite perfect, and very handsome, but the most remarkable feature was a kind of double ogée escorinon arch in the interior, which was of a character that he had not met with before. He was indebted to Boyle (the mason) for immediately reporting the discovery to him, and altogether the care and taste displayed by the "grave, skilful mason" in preserving the old window was highly commendable. The upper half of the window was now used for giving light to the cooper's workshop, the lower part, from the central transom down, remained built up. However, he hoped Mr. Sullivan would cause the whole to be opened and glazed, as it would serve to afford a good idea of what the architectural features of the domestic buildings of the abbey had been. Another even still more interesting discovery had previously been

made at the Black Abbey, which, although at the time noticed in the local newspapers, had not yet been placed on record in the Transactions of their Association, so that, as he had at all referred to the abbey, he might as well take this opportunity of having such a record now made. A very small portion of an inscription in raised old English characters had been always visible on the face of the north-east pier supporting the central belfry tower, but as a portion of the modern house of residence of the Friars was built against this pier, and covered the greater portion of the inscription, it had long been impossible to ascertain its purport. However, in course of some of the alterations and improvements lately made at the abbey, the modern wall built against the belfry piers had been removed, and the present prior, the Rev. Mr. Skelly, had kindly invited the Rev. Mr. Graves and him (Mr. Prim) to be present at the bringing of the inscription to light. On uncovering the inscription they were much gratified to find that it read as follows, conveying full information as to the benefactors to the community who had supplied the fund for building the tower, and the date, approximately, of its erection:—

"Ora pro animabus Jacobi Shortals domini de Ballylarcán et de Ballyhyte, et Katherine Whyte, ejus uxoris, qui dederunt fabricatoribus istius campanilis quorum stipem diurnam a principio usque ad finem."

The inscription, which thus ran in four lines across the face of the pier, might be thus translated:—

"Pray for the souls of James Shortal, Lord of Ballylarcán and of Ballykeeffe, and Catherine Whyte, his wife, who gave the men employed in the building of this belfry, the daily wages of whom [they defrayed] from the beginning to the end."

The tomb of James Shortal, of Ballylarcán and Ballykeeffe, and his wife, Catherine Whyte, is extant in the Cathedral of St. Canice. It is an altar-shaped monument, bearing the recumbent effigy of a knight in armour, and an inscription giving his name and that of his lady, as above, with the fact of their having "caused this tomb to be erected in the year of our Lord mcccxcvii." But that was not the year of their death, it being the custom at the time for persons to erect their tombs while they were alive. A document in the Evidence Chamber of Kilkenny Castle proved that this James Shortal was still living in 1534, and then about 70 years of age. It might be safely conjectured that he built the Black Abbey tower about the year 1500—he certainly was not likely to have entered on the work long before that time, and it was an interesting fact to compare the date with the architecture, which had all the appearance of belonging to a period at least a century older.

THE MOST ANCIENT ESSAY ON ROUND TOWERS.

Mr. Graves begged leave to introduce to the notice of the meeting the oldest written speculation upon the origin of the Round Towers of Ireland which had yet been discovered. It had not been printed hitherto, and it would be interesting to Kilkenny-men to know that it came from the pen of a local archaeologist, Bishop Rothe, who had written it early in the seventeenth century. It did not serve to throw much additional light on the Round Tower controversy, but was curious and interesting in itself, and well worthy of being put on record. Lynch, in his unpublished work, "De Præsulibus Hiberniæ" (the only known copy of which is a transcript made for Carte by a very incompetent scribe, and now preserved in the Bodleian Library, Oxford), in treating of the Diocese of Ossory, gives a memoir of Bishop David Rothe, and especially alludes to an unpublished work of his, entitled "Hierographia Hiberniæ," the title-page alone of which Rothe printed in Waterford, in 1647, being prevented by want of means from committing the rest to type. Lynch states that he had in his possession a MS. fragment of this work relating to the Diocese of Ossory, and it is from this frag-

ment, according to his express statement, the passage here given relative to the Round Towers of Ireland is taken:—

"Almost in the centre of the cemetery (of St. Canice, Kilkenny), three or four paces south of the church, stands a tall and narrow tower of circular form, in the east side of which there is a plainly formed door, raised about five yards (*recte* nine feet) from the ground, so that it cannot be entered except by a ladder. Towers of the same design are found everywhere in this kingdom, for the most part built close to the churches,—whether for ornament or defence. Our antiquaries are not agreed whence their origin was derived, or by whom they were built; for some say that they are trophies of a certain monarch who had subjected the whole island to his power, and that in memory of the victory obtained he had erected monuments of this nature in many spots within each province. But in this one diocese, within the space of a few miles, there remain four towers of this kind, so that it must seem strange that in so small a tract of country these tokens of victory should be found so thickly placed, whereas elsewhere in this land few are to be seen in very extensive territories.

"Others seek their origin higher up the stream of time, and refer them to the age of St. Patrick, as if they performed the office of belfries, from whence either by the clang of brass, or by a blazing torch, the people might be reminded to assemble to the sacred rites,—for since most places at that time were full of woods and thickets, it was needful that these towers should, by their height, appear above the tops of the forests, so that the flame would be seen, or the sound heard from a distance. But to some it seems scarcely credible that they could have stood so long, being left uncared for, although it must be confessed that, from their size and the solidity of their construction, they were of the greatest strength; and already in very many places exhibiting decay, their existence is threatened, and elsewhere they have fallen to the ground, as in the city of Ferns. The Danes are said to have first erected these round and slender turrets to serve as watch towers, from whence an extensive view might be had around; whilst afterwards it became the custom to hang bells in their upper portions, and so to make them serve the purpose of belfries, although they do not rise from the middle of the fabric of the church, supported on arches, as is now the custom, but are reared to a fitting height from the soil of the cemetery; for even the etymon of their name indicates that they were accommodated to this purpose—for *clogtheach*" is their Irish appellation, which is the same word as *house of the bell*—the word *clog* signifying *bell*, and *teach* *house*; of which kind we have scarcely ever seen one in Ireland, except in the cemeteries of the cathedral churches, or of the most noted abbeys."

This ancient Round Tower disquisition excited much interest amongst the members present, the theory of the towers being erected as trophies of war, being a new one to all, and voted most improbable. Lynch himself has hitherto been considered the first to have broached the equally improbable theory of the Danes being the tower builders, but he was, it now appears, preceded in the recording of that speculation by Rothe, who, although his contemporary, was an old man when he was a youth.

OGHAM INSCRIPTIONS.

Mr. Prim said he had to propose the placing on record in the Transactions of another interesting discovery in this locality—an Ogham inscription on one of the stones which had been used as ordinary building material in the erection of the chancel of the old church of Claragh, four miles from Kilkenny. Mr. John Moore, Columbkille, in taking a walk through that very interesting district, observed this stone, and called his (Mr. Prim's) attention to it; and on visiting the place he found that it was a veritable Ogham inscription, although the stone was so weather-worn that the scores were scarcely visible by the light afforded on the very gloomy day on which his visit had been paid. He had made a sketch of the inscription as far as he could make it out; but he doubted that it could ever be entirely deciphered. However, on a brighter day, and when provided with the necessary apparatus for clearing round the edges so as to see portions of the stone now embedded in the masonry around it, he hoped to make a more perfect transcript of the characters so far as they might be legible. He had not been at Claragh previously since his school-

* By a mistake of the scribe, written *cloghtevill* in the Bodleian transcript.

boy days, when he was not capable of appreciating such matters, and on his present visit he was delighted to find in the chancel of the old church—originally, apparently, the entire church, but to which the nave, a commonplace structure, had been added some centuries later—a very ancient and interesting building indeed, the masonry of which partook of the Cyclopean character. The round head of the little east window was cut out of a single stone; but the casing of this window seemed in danger of falling out very soon, and leaving an unsightly breach, if something were not done for its preservation. The whole south wall of the chancel also, including a curious square-headed window, was in a threatening state, from a large elder tree having grown up through the masonry, rending and shaking it from bottom to top. The stone inscribed with the Ogham was placed in the east gable, beneath the round-headed window already referred to. Mr. Graves had promised to accompany him in his next visit to Claragh, and he hoped they would be able to give a fuller report at the next meeting respecting the reading of the Ogham; and perhaps also, they might be able to propose some means of saving this very interesting old church from the utter destruction which otherwise seemed impending.

Mr. G. M. Atkinson presented a drawing of a curious Ogham stone preserved in the Royal Institution Museum, Cork. A reading and interpretation of the inscription he had left to his friend Mr. Brash; but he wished to direct attention to the coffin, boat, or ark-like shape of the monument, and the strange fact of the under side being quite smooth, as if it had been drawn along the ground. The inscription showed two very distinct methods used in engraving Ogham writing. He had observed, when drawing Oghams, that three very different methods were employed by the Ogham engravers, and had found two of these methods frequently used on one stone. The first, or perhaps the oldest, was a large and broad mark, as if executed with a blunt kind of instrument; the second was sharp and fine, well cut, and like as if rubbed with a point and water afterwards; the third, a very fine scored mark, as if scratched.

VANDALISM IN ENGLAND.

Mr. G. M. Atkinson also sent some beautifully-executed drawings, with plan and section, of an ancient British earthwork, known as Bower-Walls Camp, near Bristol, adjoining the suspension bridge over the Avon at Clifton, which he informed the meeting was at present being demolished for the sake of obtaining the stones of which it was composed to burn into lime. He asked that the Association should protest against such a proceeding.

Mr. Graves observed that, seeing how we are plagued with Goths at home in Ireland, it seemed curious to find us applied to denounce English Vandals. However, he moved that the Association should enter its solemn and most decided protest against this outrage now being perpetrated at Bristol.

CRANNAGE EXPLORATIONS.

Mr. W. F. Wakeman contributed a very interesting account of three hitherto unnoticed crannoges in Drumgay Lake, near Enniskillen, and forwarded for the inspection of the meeting a number of fragments of fictile vessels, found with other remains of the household implements and utensils of the ancient inhabitants of those lake-dwellings.

Mr. Graves remarked on the great interest attaching to these fragments of pottery, nothing like which he had yet seen, except the single portion of a fictile vessel found in the kitchen midden at Ardahue, County of Carlow, and already engraved by the Society. They should have the objects now before them engraved to illustrate Mr. Wakeman's paper.

Mr. Wakeman also contributed a series of drawings of remarkable sepulchral monumental slabs from various places in Ireland, accompanied with interesting descriptive details.

Amongst the other papers brought before

the meeting, were "Notes on a Cromlech-like Doorway to a Liss" at Renoyle, County Galway, with drawings by Mr. G. H. Kinahan, M.R.I.A.; and an account of the drawing of the ancient oak-floor of a house, having a stone fireplace in the centre, found at Curaghage, Barony of Farney (also with a drawing), by Mr. G. Morant, Shirley House, Carrickmacross.

Thanks having been voted to donors and exhibitors, the Association adjourned till the first Wednesday in July.

THE ROYAL IRISH ACADEMY.

A GENERAL meeting of the Academy was held on Monday evening:

Lord TALBOT DE MALAHIDE in the chair.

William K. Sullivan, Esq., Ph.D., sec., stated that he believed many of the members were already aware that the light had been excluded for some days from the southern windows of the Academy House, owing to some question between the Corporation and the Board of Works. The former body had taken a very decisive course in bringing the discussion to an end, by putting a wooden partition up before the windows. He was glad to say that this had the desired effect, as Mr. McClintock, on the part of the Board of Works, had intimated to the council that an agreement had at length been come to with the Corporation, whereby it was arranged that all the windows were to be kept open so long as the house was occupied by the Royal Irish Academy, or for any other purpose the Lords of the Treasury might desire, except as an hospital or barrack, or such purpose.

Dr. William Frazer read an interesting and instructive paper on "Esparto or Spanish Grass," in which he enumerated the different purposes for which the grass was used, the principal being the manufacture of paper, of which he exhibited several specimens.

Dr. Sullivan read a paper, by the late Rev. Dr. Wills, "On the development of the Affections."

The papers were referred to the council for publication.

On the subject of the exclusion of light from the windows of the Academy House overlooking the grounds attached to the Mayoralty House, our contemporary the *Express* says:—"Some years ago we published a correspondence between a member of the Royal Irish Academy and Mr. Morgan, one of the Law Agents of the Corporation, respecting the fluted glass which the latter, by order of the Corporation, had caused to be put in certain windows of the Academy House, in Dawson-street, so as to prevent those within from inspecting the occupants of the Mayoralty ground. From that correspondence we learned that there was a legal question at issue respecting the rights of the Board of Works—who are the lessees of the premises—and the Corporation, whose grounds adjoin them. During the past week the matter has been brought to an issue by the Corporation placing a boarding opposite the outside of the 18 windows, which they say the Board of Works had no right to open, or keep open, if they found them so. Not long ago a question was brought forward in Parliament respecting the insecurity of the house, and the objection of certain Dublin offices to continue their insurances at the ordinary rate. It has been asserted that the heating apparatus was very defective. It was stated in the public papers that the library had been entered and robbed of some trivial matters from the clerk's desk; and finally a commission was appointed for inquiring into the state of the scientific institutions in Dublin, and the noblemen and gentlemen thereon declared the Academy House incapable of being rendered either sufficient or secure, and recommended the erection of a new special building in the neighbourhood of the Dublin Society. Surely the fact of the Corporation having the power of blocking up the windows of a public institution like this ought at once be communicated to the Government, and should strengthen the hands of those who plead for the removal of the Academy to another place."

THE ROYAL GEOLOGICAL SOCIETY OF IRELAND.

A GENERAL meeting of the above society was held on Wednesday evening in the Museum Building, Trinity College,

The Rev. Professor HAUGHTON presiding.

Dr. Emerson T. Reynolds read a paper "On some points in the Classification of the Anhydrous Mineral Silicates." In this paper the author sought chiefly to account for the remarkable variations in the proportions of silica in the members of the well-known mineral group of feldspars, and showed that the variations referred to could be most easily and naturally explained in accordance with the theory of the constitution of the mineral silicates recently proposed by him. Owing to the wide differences known to exist between the atomic ratios of the basic to the acid constituents of the several members of the otherwise strongly marked feldspar family, mineralogists had been hitherto obliged to adopt either of two modes of explaining the apparent anomalies. On one view, a portion of the silica in such minerals as orthoclase, albite, and oligoclase was considered as basic; on the other hand, many regarded this as apparently unnecessary, and as supplemental or "accessory silica." Dr. Reynolds observed that neither view was sufficiently consistent with the principles of modern chemistry to render either satisfactory to the intelligent student of mineralogy. But when the feldspar family was considered in accordance with his theory of the constituents of the silicates, the relations of its members could not only be easily traced, but the variations in the proportion of silica found in the members of the group are seen to be methodic; and the result of the partial or complete satisfaction of the tendency of silica to condense at a given rate within the molecules of the feldspar. It was further shown that in this view it was easy to account for the occurrence of the highly silicated compounds, orthoclase, albite, &c., in the granite rocks, while the less acid feldspars, such as anorthite, were most abundant in the true volcanic rocks.

Dr. Macalister read a paper on "The Measurement of Typical Irish Skulls," in which he stated that the Anatomical Museum of Trinity College has recently been enriched by the addition of a collection of such specimens of the *crania* of the existing Irish race, which, as a matter of course, were of much ethnological interest.

INSTITUTION OF CIVIL ENGINEERS OF IRELAND.

At a meeting of this institution held on Wednesday evening in the Museum Building, Trinity College (SAMUEL DOWNING, Esq., LL.D., in the chair), Colonel Meadows Taylor explained a practical improvement in the use of the plane table, as employed by him in the Survey of India. Mr. William Anderson read a short paper on "Hydraulic Machinery for obtaining small motive power." Both papers were shortly discussed.

ENGLISH SPELLING.

THE Rev. C. D. Ginsburg presided over a meeting last week, in Liverpool, which was called to consider a project for improving the common method of English spelling. The subject was introduced by Mr. E. Jones, head master of the Hibernian Schools in that town. Mr. Jones contended that the tendency of our language is to throw off redundant letters, and his proposal is to quicken this tendency. For example, he derives the words "ruffle" and "ruffian" from *rough*, and if his derivation be right (which we doubt), he asks why we cannot spell "rough" with three letters, *ruf*? He proposes to spell laugh, *laf*; tough, *tuf*; though, *tho*; and so on to the end. He cited the case of Walter Savage Landor, and another speaker referred to the spelling reform introduced into America, where the newspapers spell theatre, *theater*; centre, *center*; mitre, *miter*. The general opinion at Liverpool seemed to be that a change is desirable, and could be easily made, "if the

editors of periodicals would only lead the way." This may be the case, but these orthographic reformers ought to be quite sure that editors of periodicals will *not* lead the way. The public eye is sensitive and conservative; and no editor likes to offend the public eye by placing before it forms which are either uncouth or strange. Every reform demands a martyr. Walter Savage Landor made himself a martyr in this cause to a very slight extent, by writing sovereign *socran*, Pole *Polander*, and a few other words in an unusual manner. The public objected to these changes, and to the extent of that objection Landor suffered loss.—*Athenæum*.

ST. MALACHY'S DIOCESAN SEMINARY OF DOWN AND CONNOR.

Our illustration with this issue is a bird's-eye view of the New Catholic Seminary in Belfast.

The grounds of the Seminary adjoin the Convent and Orphanage, and the three buildings form a most picturesque group, not only from the excellence of the buildings themselves, but also from their beautiful situation, being built on a considerable eminence which overlooks the town and portions of the surrounding country.

The Seminary has been rebuilt with special regard to the physical requirements of the occupants. The apartments are lofty and well lighted, with ample provision for ventilation and heating. The principal dormitories are 20 feet in height, and afford more than 1,000 cubic feet of space for each bed. There are three of these dormitories, affording sufficient accommodation for 100 beds; lavatories and bath-rooms are attached, and each dormitory communicates with the bed-room of the master in charge, who thus has his pupils always under supervision. On the ground floor are situated the chapel, study-hall, and refectory, the latter provides seats for 150 persons. The principal entrance is under the tower (as seen in view), which runs directly opposite the entrance from the Antrim Road. Within the entrance is a vestibule communicating with the reception-room, staircase, and principal hall, beyond which is the cloister extending the whole length of the main building; and affording ample space for a promenade when the weather is unfavourable for out exercise.

The chapel has been richly furnished at an expense of more than £300, and can accommodate over 200 persons. It is separated from one of the class halls by folding doors, so that it can for special public occasions be extended to seat 400 persons. The chapel wing shown in our illustration, and the belfry stage of tower have not as yet been carried out, but it is to be hoped that these works will soon be commenced, as they are essentially necessary to the completeness of the design.

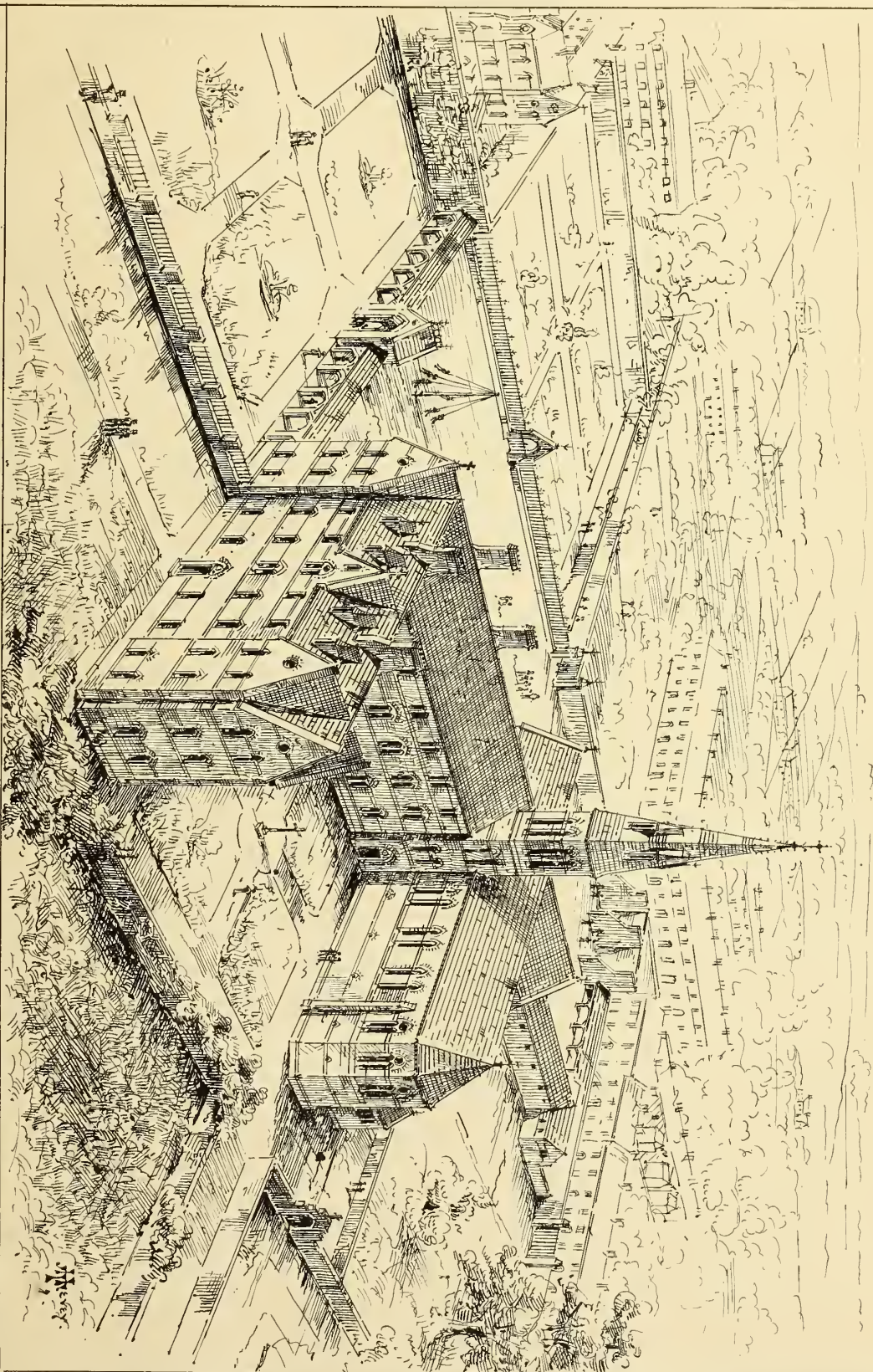
There are extensive play-grounds and gardens, as may be seen in sketch, provided with every requisite necessary for the health and physical development of the students.

We understand that there are at present about 40 internal students or boarders, and about 120 or 130 externals. The teaching staff of the seminary is large and of unusual excellence, and under the personal direction of the learned President, the Very Rev. Richard Marner, to whom belongs, in a great degree, the credit of having raised the Diocesan Seminary of Belfast to its present position, by his zealous and untiring exertions.

The portions of the work already done were executed by Messrs. Byrne, at a cost of about £6,500, from Mr. O'Neill's plans,

LECTURES ON LOGIC AT THE CATHOLIC UNIVERSITY.

ON Tuesday last the introductory lecture of a course on the subject of "Logic" was delivered by Professor D. B. Dunne in the Theatre of the School of Medicine, Cecilia-street. Having explained the origin and meaning of the term "Logic," he proceeded to explain its suitability in a system of medical education. And now (continued the lecturer) I have told you what logic is, as well as I could; or, rather, I have endeavoured to lead you to recognise for yourselves what it is, by pointing out to you that unfailing source of knowledge in all mental science—a thorough analysis of the mental operations. But it is quite enough to raise my eyes towards the benches upon which you sit, to look upon this wall behind me, or to recall the many solemn occasions upon which it has been my privilege to assist at exercises of various kinds connected with your professional studies, to be reminded that this is not sufficient here. It is not enough, you may fairly except, to say what logic is; it is necessary to further say what business has she here. You, with your anatomy, so minutely scrutinizing every even invisible fragment of the human body, and compiling for our wonder and instruction that stupendous catalogue of every bone, and muscle, and sinew, and nerve, and fibre, and tissue—with your chemistry, analyzing with almost an artificer's hand the materials of which this body is built up, tracing them through all their developments from their most primitive condition to their most complicated structure, and pointing out the fatal agents which will sooner or later hasten the work of disintegration—with your surgery and your medicine, to tell how this marvellous human machine is to be repaired if injured in its framework, or rehabilitated if weakened in its functions or deranged in its operations. You whose great business, whose most urgent special duty it is to study this human body, every detail of its construction and its activity, you may well ask me what business has a mental science, such as we have ascertained logic to be, here where corporeal studies have fixed their exclusive home? It would be quite impossible to answer this question in a way proportionate to its seriousness, or fitting your intelligence within the few moments which may, perhaps, remain at our disposal. I will only ask you to reflect that logic alone is the key to the scientific value of these studies upon which your thoughts are ever fixed. But for the mental process by which their doctrines have been confined together; but for the principles upon which the validity of their influences—not as facts, but as deductive instruments—rests, all those myriad teachings would be valueless as scientific information, they would be mere fragments of knowledge, incapable of forming the first link of a chain of intelligent induction. As well might one pretend that he had built, and completed, and furnished a palace, when he had gathered together the bricks and the wood, the lime and the sand. It is logic which not only supplies us with the means, the machinery, and scaffolding, and tools by which the scattered elements of information may be set together in workmanlike fashion, and the scientific edifice raised tier above tier to its summit; but it also furnishes the mortar and cement which secures its cohesion and permanence. Has the doctrine which does this for all those studies which now engross your attention no place among the material sciences? Has it no claim upon your own consideration? Has it no right to ask standing-room even in halls professedly devoted to medicine? Logic is not, it is true, a material instrument of knowledge, that is, a means of extending our information by the discovery of new facts, because, being indifferent to the matter of thought, it cannot tend in one direction rather than in another. But it is not only most useful as the formal instrument of knowledge, but it is indispensable, because the only one by which



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information already acquired, facts already observed, may be digested into that order and form, while it is at the same time the necessary condition of our understanding and of all scientific knowledge. Logic cannot make you a physiologist or a chemist, because it is conversant with the forms only of thought, and these are identical to whatever object they may be applied. But then take away logic. Without it your physiological and chemical facts are mere dissociated elements, unconnected, unrelated, incapable of coalescing into a science. The geometrician who investigates the formula of the ellipse is indifferent as to the application of his theorem to tracing the path of a planet or the arch of a bridge. Yet neither the one nor the other operation could be performed without his teaching. But no one on this account would pretend that a claim was being set up for geometry to supersede or control astronomy or architecture. The only difference is that no one ventures to enter upon the study of those sciences who is unacquainted with geometry. Would that the same prudent reserve existed in the case of other sciences. In the same way if logic cannot "minister to a mind diseased" to the extent of remedying the various errors which originate in the nature of the objects of our knowledge, yet it can do so to the extent of purging the mind of those errors which arise from, in consequence and confusion in thinking, thus forming an invaluable auxiliary in any medical investigation into abnormal mental phenomena. Prof. Dunne concluded by quoting the pithy and practical summary on this matter of John Stuart Mill:—

To draw inferences has been said to be the great business of life. Everyone has daily, hourly, and momentary need of ascertaining facts which he has not directly observed; not from any general purpose of adding to his stock of knowledge, but because the facts themselves are of importance to his interests or to his occupations. The business of the physician, of the navigator, of the agriculturist is merely to judge of evidence and to act accordingly. Logic is the common judge and arbiter of all particular investigations. It does not undertake to find evidence (to discover facts), but to determine whether it has been found. Logic neither observes, nor invents, nor discovers, but judges. It is no part of the business of logic to inform the surgeon what appearances are found to accompany a violent death. This he must learn from his own experience and observation, or from that of others, his predecessors in his particular pursuit. But logic sits in judgment on the sufficiency of that observation and experience to justify his rules, and on the sufficiency of his rules to justify his conduct. It does not give him proofs, but teaches him what makes them proofs, and how he is to judge of them. It does not teach that any particular fact proves any other, but points out to what conditions all facts must conform in order that they may prove other facts.

CHEAP RAILWAYS.

I THINK (writes a correspondent of the *Builder*) it is high time that we had some reform in our railway system, at least for villages and country places, where the roads are such as the gradients are not more than 1 in 12; I say 1 in 12, because I understand that has been tried and found to answer; although a deeper gradient than that can be managed with light trains, and adding weight and power to the engine, or adopting the horizontal wheel and screw friction. Before our railway days a man could build a house anywhere, and he was at home, because the convenience was nearly as good in one place as another, viz., the common road; but now, unless he builds near to a railway, he is nowhere, as the common saying is,—he is out of the world,—and from that cause the country places are neglected, their populations are decreasing, and people are flocking to the railways; also, the land in country places is getting poorer, because there is not

sufficient animal and other kinds of matter to maintain the soil, while the towns are getting larger, and the populations increasing so much, that the sewage and other refuse cannot be applied to the land, so that it is allowed to run into the rivers and pollute them. Our manure is running into the sea instead of being used on the land, and the country places are seldom found to improve. I do not pretend to say this state of things can be stopped, but I think it might to some extent be checked; at all events, some good can be done to the villages and other important country places. Where the gradients are not more than 1 in 12, instead of making a railway at a cost of some £40,000 per mile, driving through hill and dale, and cutting down all sorts of valuable property, levelling and straightening, no matter whatever the cost, lay a line of rails on the road side, and one engine would do all the work, both passengers and goods, for short distances; but where the approaches are favourable and practicable, the main-line carriages and trucks could run on the road branches, which I believe could be done at about three or four thousand pounds per mile, less perhaps than the road itself cost; so that there would not be such a large sum to pay for interest upon the first outlay, which is the killing of all railway schemes for country places. I believe if this could be done the net work of railways would be rapidly increased throughout the land; and in a few years we should have railways nearly at as little cost as we now have the roads made, and, with the Mont Cenis three-wheel plan, or Mr. Farlie's Bogie engine, curves are no objects of great importance, no matter how sharp they are, so that we could travel on any road, no matter how circuitous, although the straighter and nearer level a road is the better; but the cost of making them so is a consideration; but where the traffic is light there would be no need to run more than ten or fifteen miles an hour, because for small places there is little need, and the speed could be increased as the traffic increased.

Some may urge that it would be dangerous to the horses and passengers on the road. I say, not so; for as to horses there would be very few on the road, the rails would do nearly all the work. Besides, the horses would become so accustomed to the trains that they would take no notice of them, as they now do near all railway trains. I have seen a horse grazing within a few feet of a train when passing, and he never as much as lifted his head from the grass; and as for foot passengers, they would also be fewer, and it is just possible to make it quite secure by fencing the rails off; and I think I could adopt a brake, the plan of which I can produce, with which the guard might stop a train when going at full speed in a very short time, so that on rather long branches, and where there are few passengers, he could stop and take a single passenger anywhere, like the driver of an omnibus does. There would be no levelling nor straightening of the roads where the gradients do not exceed 1 in 12, and the curves do not matter when going at a speed of say ten or fifteen miles an hour. It could be tried on one of the best roads first, and if it answers (and I have no doubt of it; in fact, it cannot fail), it would be very soon tried on another, and then another, and so on, till it had found all roads in England, where practicable: then the villages and country places would have a railway such as would do the work, and such as they could pay for. The great advantage of railways is having the smooth iron rail to run on, instead of the sandy road, where the wheels are always sinking more or less, according to the weight they carry, no matter how hard the road is: so that they are always pulling up an incline, even when the road is level. It is not so much in the steam-engine as the iron rail that we find the advantage of railways, but of course they both work well together. To apply a locomotive engine on the highways without iron rails is, to say the least of it, an uningenious plan, and they who have tried it cannot be possessed

of good theory. It is impossible to have proper friction in the sand; and as the wheels are constantly sinking to some extent, the load needs more propelling, and the engine is less powerful to propel it.

There has been a great deal said lately about railways not paying, and a good many schemes have been thrown out of the House of Commons, on the ground that they would not pay, and that there were already more railways than could amply pay their shareholders: that is simply because they are so expensively made. If a railway or branch line is mooted for a village, or country place, they say at once, "Oh, it will not pay;" and there is great difficulty in getting railway companies to make branch lines to villages, except where they see the danger of a competing company making a line, and so taking away their traffic. The branch lines cannot pay on the present expensive system, simply because there is not sufficient traffic in the district; but let a company make a line on the road between villages and towns, and I venture to say that they would find it to pay as well or better than most railways in England. Of course they would have to get an Act of Parliament before they could do so; that is just what I am now seeking to be done in order that the country may get relieved of the dreadful want of iron rails to run wheels on. I imagine it only wants to be seen to be appreciated, and, once begun, I believe it would go along faster than the other railways have been. The great advantage of the iron rails instead of the roads can be seen from the fact that, while the horse is loaded with 30 cwt. or 40 cwt. on an ordinary road, the same horse can draw 30 tons or 40 tons on the rails of the same level; so that to me it seems strange that we have dragged our loads so long on the rough roads, and that we have not adopted the smooth iron rails long ago,—not by horses, but by steam, whereby the transit can be so much facilitated, and the time seems now of great importance: besides, the land which it takes to grow corn and other commodities for horses could be adapted to the growth of other things, so that it would have a tendency to make corn, milk, butter, &c., cheaper. Some would say, "Look how you would narrow the road, and then there would not be room left for the horses, carts, &c., on the road." I say there would be far more room left than there is now, in proportion to the work they would have to do; because, suppose the rails took, say, 9 ft. or 10 ft. from the road, there would roads still be left about 20 ft., so there would be only one-third of the road taken; but I should think that nine-tenths of the traffic would be taken by the rails. There would be very little more to do than the laying of the sleepers and rails, so that the cost could not be great, and having only one line of rails, which would be quite ample, in nearly all places there would be no fear of collisions. The roads are made, and the surveyors or roadmakers have continually lowered the hills, and raised the valleys, so that a moderate uniform gradient is already secured, and I should think quite hard enough when the sleepers and rails are laid to bear the weight of the locomotive engine, so that the roads need but a very slight application to convert them into railways.

A locomotive engine with its train of carriages would be a clumsy monster to move on the highways without rails, but lay the rails, and it would do its work as well as any other railway of the same gradient and curvature. There would be no need to apply the Mont Cenis 3-wheel plan, or Mr. Farlie's Bogie engine, except where there are very deep gradients and sharp curves; but where there is a reasonable gradient, say 1 in 30, or 1 in 40, the ordinary fast-wheel system would be the best and safest, and they can take moderately sharp curves, which can be seen on all railways, although curves detract a little from the power of the engine. As I said before, the best roads could be tried first, and on the ordinary fast-wheel plan, which could not fail, but would be a decided success.

ON THE DUTIES OF AN ARCHITECT WITH REFERENCE TO THE ARRANGEMENT AND CONSTRUCTION OF A BUILDING.*

FAMILIAR as we all are with buildings, there exists good reason for supposing that by many the nature of an architect's work is less thoroughly understood than might have been expected: I have, consequently, thought that an endeavour to make quite clear what he can, and what he cannot do, would be of service.

Suppose that an individual is possessed of a site, probably recently bought, and of the needful funds, and is minded to build himself a house. We will further suppose, for the sake of simplicity, that this is a country site, and that some circumstance points out beyond question one particular situation on the estate as proper for the building, so that no trouble as to selection of the exact spot has to be encountered. The question immediately to be solved being what sort of house to build, and how to set about it; the first step, in all probability, will be to visit, or at least to think and talk over, some houses already known about.

It is foreign to my purpose to say anything about how the architect is selected, though it is fair to add that the selection is a matter of considerable importance. In the case of public buildings, competition is very frequently resorted to; this is rarely done in private practice.

The first step, after the architect has received some preliminary instructions as to the general nature of the building wanted, will be for him to visit the site. It is, perhaps, best that he should be able to form some very vague general idea of the size and sort of house intended, before seeing the ground it is to be built upon, but no wise architect will put pencil to paper without first seeing where his future work is to stand, and what will be near it, and studying the peculiarities of the site with some care, or (if that be quite impossible), without trying to form a good idea of it from maps and photographs. The points to be specially noticed on a site are the aspects obtainable from different rooms, and prospects from different windows; the peculiarities of shelter or exposure; the approaches, and space for gardens, grounds, &c.; the facilities for drainage and water supply; the dryness or dampness of the site, and its levels; the nature of the building materials within easy reach; and such local peculiarities of surrounding, or association, or character of scenery, or of neighbouring buildings, as influence style or design. It is now necessary to have sufficient instructions to shape a design upon, and here, as is natural, the custom varies with the peculiarities of each client. In all probability the most satisfactory results are obtained by simply telling the architect what requirements it is wished to accommodate, and what special or unusual arrangements are required to be introduced, and giving him access to any model, either as to arrangement, size of rooms, or treatment which it is wished to follow, settling, in fact, the outlines of accommodation wanted in consultation with him, but leaving it very much to him to suggest how that accommodation shall be disposed.

It is often the case that this part of the question is not easily disposed of. The architect's previous knowledge of the subject, the client's knowledge of what he requires, and the difficulties of site, frontage, and what not, under which he labours, are not the same in any two cases, and the trouble varies as they vary.

When, however, the subject is fairly grasped, the architect now begins his design. Probably the mode of originating and elaborating an architectural design varies considerably according to the habits and idiosyncrasy of each artist. I am inclined, however, to believe that in most cases a building is not first imagined as a building, but as a drawing—in fact, as a ground plan. Certainly the

almost invariable custom is to commence upon the plan of the principal floor, and carry the arrangement of that on for some little way before touching any part of the work. There will be ordinarily some simple germ, usually growing out of the arrangement of the communications between the best rooms, which will give the key-note, so to speak, of the whole. Such questions as the following are the ones which determine the lines of the skeleton of a plan: Shall the building be symmetrical or irregular? Shall the rooms be entered from a hall or a corridor? In which direction will the offices, &c., lie best? From which side will the approach come? Where can the leading rooms be best placed for aspect, prospect, communications, and grouping? The chances are, that when those questions have been thought over for an hour, the true principle of arrangement, in order to combine them all, presents itself to the mind, and the key to the problem once found, the plan seems, in practised hands, almost to develop itself spontaneously.

At length a series of fair sketches, embodying the main ideas of a design, has been prepared; and now, if not before, it usually becomes necessary to look into the question of cost.

In many cases the architect is furnished by his clients, at the outset, with a statement of the sum to be laid out, as well as of the accommodation to be obtained, and it not unfrequently happens, by the bye, that the first is not adequate to secure the latter. It is, however, a more frequent case that, in the first instance, the accommodation desired is named, and the architect is requested in making his design to state its cost as near as he can. However this may be, it may be accepted as a general principle, that most of us, when about to build, want more for our money than we can possibly get, and that, sooner or later, a conflict between cost and size has to be encountered.

The elements of this difficulty of estimating are twofold—first, the extremely wide range of costliness or cheapness possible to buildings of the same size and for the same purpose; secondly, the extraordinary discrepancies which the estimates for the same work will present, when a dozen men are all tendering for the execution of the building, and all of them men whose business it is to get their living by knowing what work will cost to execute.

It may be supposed that architects have, or ought to have, at their finger ends a series of trustworthy average prices; that it is familiarly known, for example, how much per bed a hospital ought to cost, how much per sitting a church, how much per room a dwelling-house, and how much per child a school. Again, it may be supposed that, bulk for bulk, one building will so closely resemble another that the price per cubic foot of bulk, or per superficial foot of area covered, can be gauged to a nicety; and it is quite true that such rough rules exist, and form the basis of our approximate estimates, but nothing short of very considerable tact, skill, experience, and adroitness in applying them to practice, will make them of any real value. It is a matter of simple counting to say how many rooms there are in a house, and of simple measuring to say what the cubic contents of a building, as shown on a set of plans, will be. It requires an amount of sagacity and experience not given to every one to say at what, of all the possible prices between eighty pounds and eight hundred, each room should be rated, or at what figure between fourpence and two shillings each cubic foot of contents should be priced. A few illustrations will show the truth of what I have been saying.

It is often urged that the difficulty of obtaining reliable preliminary information as to cost is greater than it ought to be, and perhaps it is so; but buildings are not the only articles of manufacture whose prices range over a very wide margin. It appears to me that a house is a more complex thing than a black frock coat, or a wooden chest of drawers four feet high; yet the price of a coat probably ranges from three pounds to ten guineas,

and that of a chest of drawers from thirty shillings to twenty pounds; and no such extremes as are exhibited in these prices, or a hundred other familiar examples that I could name, are known in the building trade. In fact, it may be safely said that an approximate estimate of a building, prepared, with care and candour, by an experienced estimator, is to the full as reliable a document as any of the ordinary bases upon which transactions are begun; while the building which is the subject of it is very widely open to variations in the course of its after-progress.

It is very important to the future success of the undertaking that the plans made at this, its early stage, should be understood by those who commission the building. To some a plan is an almost unintelligible document, and, in that case, some slight model ought to be constructed, to make arrangement, and even, in some cases, appearance, clear. With or without this aid, and with more or less trouble, the architect has now to see that his client fairly understands what he proposes, and fairly comprehends what he, the architect, judges will be the probable outlay. The amount of alteration which takes place at or about this stage of the work is often very great. In many cases the building has to be planned afresh, or rearranged, or cut down, or enlarged, many times over, before a result considered satisfactory is obtained; in others, the design is accepted without modification. Sooner or later, however, the design is supposed to be in the main settled, and now commences the preparation of the definite drawings.

In some rare cases, the drawings made to embody the idea of the design can be completed for the execution of the work. In the majority of instances this is impracticable, and an entirely new set of plans is prepared. These ordinarily go by the name of "contract drawings," as they form the basis of the agreement with the builder who executes the work. The favourite scale for these drawings is one-eighth of an inch to one foot, that is to say, the drawing is very nearly one-hundredth of the size of the actual work, and the drawings usually prepared to this scale are plans of the foundation, of each story, and of the roof, geometrical elevations of each side of the work, and two or more sections, cut through the building from end to end and side to side, on arbitrary lines chosen so as to show those portions of the construction or arrangement which it is most important should be exhibited. These are followed by drawings on a larger scale; for the whole course of the development on paper of an architectural work consists in re-drawing again and again portions of it (or the whole), each time to a larger scale. Thus the contract or working plans, if to an "eighth" scale, as has been explained, are to a scale larger than (in fact the double of) the scale most frequently used for first sketches, and in their turn they are supplemented by drawings on a scale twice as large, namely, one quarter of an inch to a foot, showing in greater detail portions of the building; parts are again drawn out to scales of half an inch and one inch to the foot. Some details are then usually given to an eighth of full size, and the most important mouldings, enrichments, &c., are drawn full size. The set of contract drawings thus made by no means includes all the drawings necessary for the erection of the building, or even the larger number of them, but it contains all the most important general drawings, and sufficient details to enable a fair estimate to be formed of the work throughout.

The work to be gone through in the preparation of the set of contract drawings is arduous. They have often to be executed under pressure as to time, and yet they always ought to receive very full, careful attention, as in the preparation of them every point of importance, either in arrangement, construction, or treatment, ought to be anticipated and settled.

When the set of contract drawings is approaching completion, the architect has to prepare a document which accompanies them, and specifies the exact quality of material to

* From a paper read before Society of Arts, by Mr. Roger Smith, April 23, 1869.

be used, the precise mode of executing each portion of the work, and the thicknesses, weights, and other precise numerical definitions of every article open to doubt. This document is called a specification.

The proper drawing of a specification is a work of labour amounting almost to drudgery, requiring great care, patience, precision, and acquaintance with work. The most essential points about it are, that nothing should be omitted, that nothing should be slurred over or insufficiently described, and that the same amount of detail or compression should prevail throughout. It is a course of work in which system, amounting almost to routine, is essential, but, even with that assistance, the greatest vigilance is necessary to prevent omissions, however good the system may be. It is also customary to append to this specification a series of conditions, either those usual in building contracts, or such a modification of them as will suit the circumstances of the case. When these contract-plans and the specification are settled and near completion, it is not uncommon to make a second approximate estimate, and it is almost always worth while, for the basis of the estimate being in a much more complete state, it is possible to form a much more reliable calculation of the probable cost.

We have now reached the close of one complete phase of the architect's work, but one which has embraced really three distinct processes—the study of the subject, the general designing of the building, and the elaboration of the design in a practical shape.

Of the architect's study of his subject, I said at the outset little, in fact, perhaps too little, as, in many cases, this is a severe labour, and if, in any individual instance, it is quite easy, the reason is because the architect has gone through the work of acquainting himself with the same subject on some previous occasion.

(To be continued.)

THE ROYAL SOCIETY.*

THE invitation to General Sabine's second *Conversazione* was so numerous accepted, that the concourse at Burlington House on Saturday last was unusually large.

As our readers are aware, science has been compelled of late years to assist in the work of slaughter, and well was this exemplified in the spacious saloon by models of ships, specimens of rifles, carbines, cartridges, monster shells and other projectiles, and sections of Whitworth guns. These, all arranged in one room, could be critically examined and compared with one another, a privilege of which the visitors were not slow to avail themselves. The *Inconstant*, designed by Mr. E. J. Reed, and built at a royal dockyard, stood side by side with the *Captain*, designed by Captain Coles, and built at Birkenhead by Laird Brothers, and much occasion did they give for talk about "freeboard" and "topweight," and active hammering power, and passive resisting power. Some thought the upper works of the *Captain* looked as if they would be speedily shot away in an engagement, and preferred the *Inconstant*, which presents a more compact form to the shot. But, judging from the model, the formidable aspect of the vessel must have justified the remark of a north countryman as she floated into the Mersey, "Hey, mon! she's no canny." In like manner, the *De Stier* and *Krokodil*, monitor and ironclad built for the Netherlands Government, could be compared with the Admiralty model of the latest form of turret-ship, a vessel of 4,400 tons, which, we are told, will go anywhere. Shall we some day hear that she has sailed round the Cape, or weathered a gale in mid-Atlantic? Either would be an exploit to be proud of. Other models were the *Volage*, *Glatton* and *Hotspur*, which may be regarded as representative ships of the Royal Navy.

This is taking a popular view of the subject, but there is a scientific view also, as any

one may discover who looks into the *Philosophical Transactions* for 1868. There may be read 'On the Relation of Form and Dimensions to Weight of Material in the Construction of Iron-clad Ships,' by Mr. E. J. Reed, 'On Resistance of Air to the Motion of Elongated Projectiles,' by the Rev. F. Bashforth, 'On the Law of that Resistance,' by Mr. Merrifield, and 'On the Magnetism of Iron-clad Ships,' by Captain Evans. And the scientific importance of the question was further exemplified at the meeting of the Royal Society on Thursday last, by Mr. A. Smith, in his paper 'On the Causes of the Loss of the Iron-built Sailing Ship *Glenorchy*.'

From ships to guns is an easy transition; and in matters pertaining to gunnery Mr. Whitworth appeared in force. With sections of his guns and projectiles he showed how the shot is made to rotate, and how windage is provided for without "wobbling" of the shot. Cheapness of production is important in the manufacture of missiles, as in other implements; and Mr. Whitworth now casts his rifled projectiles in a self-acting mould, which turns them out ready for firing without further preparation. But as regards projectiles, the wonder of the evening was the 300lb. nine-inch shell,—a tremendous looking object, which, fired by 70lb. of powder, will travel five or six miles, and sink ships not yet in sight, should it happen to hit them. Here, again, the least possible cost is insisted on; and this ponderous shell is planned to the required form by machinery constructed for the purpose in seven minutes and a-half, at a cost of about threepence.

Small arms came next: specimens from Enfield and from Woolwich, lent by permission of the Secretary of State for War,—a Russian *Zündnadel*, the *Chassepot* with sword-bayonet, and other foreign weapons, and a series in which the recent history of cavalry carbines was illustrated,—the various developments of the *Snider*,—and last the *Martini-Henry*, the rifle which is to supersede all others. With this was a working model of the mechanism of the piece, in which inquisitive visitors might see how ingenious are the devices for driving pellets of lead or iron into human bodies.

In connexion with this may be mentioned Mr. Gisborne's automatic magnetic trigger, for firing torpedoes under water. No sooner does an enemy's ship come near where this instrument is sunk than the needle or trigger is attracted, contact is thereby made, and the explosion takes place. And Mr. Wier's pneumatic signal apparatus, which shows a green, red, or white light at the mast-head, according as the steersman turns the wheel to starboard, or port, or midships. The advantage of this method is, that it offers to an approaching ship an intimation of every move of the helm; and should render impossible the collisions at sea which are the opprobrium of modern navigation.

After all this warlike demonstration it is refreshing to turn to Captain Albini's self-registering ship's compass, which records all its movements on a ribbon of paper kept in slow motion by clockwork. Then there was a sewing-machine kept going by an air-engine; and Mr. Browning's new electric lamp, which maintains the carbon points at the proper distance apart for a steady light. Mr. Siemens showed the sounding-line, and the electrical resistance thermometer for the measurement of deep-sea temperatures, which he proposes for use in the forthcoming dredging expedition under Dr. Carpenter and Prof. Wyville Thomson. Dr. Hawkesley exhibited a stetho-sphygmograph, an instrument of threefold function, giving simultaneous indications of the movements of the heart, pulse, and breathing. Some timid people are afraid of it, fancying perhaps that it reveals too much.

Among optical instruments worthy of notice was the kaleidoscope, which exhibits its beautiful effects by means of a slide and polarized light, invented by J. Huggins, of Norwich; and Mr. Crookes's microscope, which combines a new arrangement of the

binocular spectrum, giving a larger field and increased dispersion.

For meteorologists there was a rain-gauge newly contrived by Mr. Beckley, of Kew Observatory, which is self-recording, and does its work very ingeniously, and with due precautions against the effects of damp. And for civil engineers there was a working model of Hodgson's wire-rope tramway: a clever invention for the transport of minerals at a small cost over a rough country. The wire-rope is endless, working on pulleys supported by posts. The car, or box, hangs upon the rope by a couple of pulleys, whereby it runs easily over all the points of support, and so carries its load down one side and returns empty along the other. A line of this sort has been in operation for some months conveying granite from a quarry in Barden Hill (Charnwood Forest) to a village three miles distant. And we hear that a similar line is to be erected at the gold mines in the Val Anzasca.

AMERICAN RAILROADS.

THERE are, no doubt, a great many blanks as well as prizes in the American railroad lottery; but there can be no question that many of the lines brought into operation in the Great Republic—which, if it can but hold together as one united nation, must inevitably be the greatest power in the world by the end of the century—have turned out remarkably well. This is especially the case with lines in the western states of the Union, as appears from the case of one enterprise more especially brought under our notice,—viz., the Chicago and Alton Railroad. This undertaking acquired, in 1868, 4,508,643 dols., as compared with 3,892,861 dols. in 1867; while the working expenses were 2,463,182 dols. in 1868, as compared with 2,149,128 dols. in 1867, leaving the net earnings of 1868 at 2,045,460 dols., as compared with 1,743,733 dols. in 1867. A balance of 924,352 dols. was brought forward from 1867 to the credit of 1868, making the whole amount available for interest and dividend for the past year 2,969,812 dols. After providing for interest on bonds and rents, and applying (out of revenue) 635,766 dols. to improvements of the line, a dividend was paid for 1868 at the rate of ten per cent. per annum; and even after this dividend had been paid, a balance of 984,667 dols. remained to be carried forward to the credit of 1869. Such results are truly remarkable, and it is only to be hoped, for the sake of the stockholders in the Chicago and Alton, that a similar prosperity will be enjoyed to the end of the chapter.

The improvements executed upon the road last year consisted in the doubling of certain portions of the line, so as to admit of more frequent trains being run than could be accommodated upon a single line, as which the Chicago and Alton was constructed in the first instance. The line has rapidly developed a respectable and increasing coal traffic, 6,000 tons having been carried in 1865, 71,090 tons in 1866, 146,050 tons in 1867, and 166,986 tons in 1868. According to apparently reliable statistics, fifty-one per cent. of the whole amount of bituminous coal received by railway at Chicago during 1868 came over the Chicago and Alton, and the traffic of 1868 would, it is stated, have shown a more considerable increase over 1867 than it actually presented but for a strike in the mining district. New mines are now being opened contiguous to the line, and, as the old mines are also again in working, a large increase in the coal traffic carried is anticipated during the present year. All this is interesting, as it shows the constant growth of the prodigious industrial activity of Chicago, and the general material advance made by the surrounding district. With a few years of continued peace, Chicago, which has been growing like a fungus for the last thirty years, will have attained a still grander position in the Republic, and will be consuming more

* From the *Athenæum*.

coal and shipping more corn than ever. It is said of Illinois, and with apparent truth, that the progress of life and wealth in the State is so rapid, that the census and statistics of one year are no standard for the next.

The ten per cent. dividends of the Chicago and Alton are not, then, very surprising under all the circumstances of the case. In England the energies of railway capitalists have been too often frittered away in barren rivalries and profitless competitions. The North British and the Caledonian have been engaged in well nigh endless strife in the north; the Midland and the London and North Western run into each other in half the English counties; and the London and South Western and the Great Western compete sharply for business in the extreme west. The best American lines, on the other hand, are not hampered by competition at present,—whatever may be the case some day; but every dollar expended in their construction tells, and tells profitably. Further, the expenditure for land is generally much less in the United States than in Great Britain; while companies are allowed to obtain corporate powers at a far cheaper rate in America than on this side of the Atlantic. When we combine together all these favouring circumstances—freedom from great preliminary expenses, moderation of land charges, and absence of competition for traffic (at any rate in many districts)—it is not difficult to account for ten per cent. dividends in America, as compared with the four or five per cent., and occasionally the poor one or two per cent., doled out to English shareholders. The constructive works of American lines are lighter than those of England, and the appointments generally are also rougher. But, taken as a whole, we fear it must be admitted that American railway property proves more lucrative than English does to those embarking in it.

Not that English railway enterprise has been altogether unfruitful; on the contrary, many of the great English lines, in spite of every obstacle, have yielded surprisingly large traffics, while there appears to be scarcely any limit to the gradual development of the business done upon them. But many of the great English railways are weighed down by a terrible amount of wasted capital to provide even a small interest, upon which involves the greatest skill and the most unwearied energy, while anything like a brilliant remuneration of this capital is out of the question. Perhaps in time, when the United States become as rich as England, capital may be wasted in the same lavish fashion, and lines at present highly profitable may become overborne, as in England, by leases, guarantees, and competitions. But this result, if it is ever witnessed, will not occur yet, as a long period will be occupied in colonizing the vast regions which will be opened up in the Pacific Railroad, upon which trains will be running throughout in July. The vastness and wildness of the American continent affords the most abundant scope for the most restless minds. In England, on the contrary, it is difficult to find a district which is not riddled by railways. Indeed it is becoming a question, with regard to British railways, whether it is not time to exclaim—"Enough, enough." Railway investment has been an easy and tempting channel for the employment of capital, but it is obviously a matter of essential importance that an interest of some kind or other should be obtained. When this interest ceases to be forthcoming, our capitalists will cease to adventure their savings in more railways at home, and will probably follow the advice of Reverdy Johnson, and embark some of their accumulated resources on the other side of the Atlantic.—*Colliery Guardian*.

THE ALBERT MEMORIAL IN BELFAST.

THIS splendid testimonial to the memory of the late Prince Albert the Good is now nearly completed, and we (*News-letter*) believe the finely sculptured figure of his Royal High-

ness to be placed in the front of the monument will be ready at the end of this month. In a short time, also, the splendid clock will be elevated to its position. A meeting of the Albert Memorial Committee was held on Monday, in the Town Hall—John Lytle, Esq., J.P., in the chair,—when it was resolved that her Majesty the Queen should be invited to be present at the inauguration of the memorial, at whatever time in June would suit her Majesty's royal arrangements. In the event of her Majesty not finding a visit to Belfast convenient, which the committee would regret to learn, it was agreed that the Prince of Wales and his amiable Princess should be invited to take part in a ceremony so suggestive of the loyalty of the promoters of the testimonial and the universal feeling of esteem for the memory of the great and good Prince Consort. The memorial, which is a credit to our town, and one of its greatest ornaments, will be completed having a debt of £700 against it, which sum we are sure there will be no difficulty in raising amongst those who have not yet subscribed. The munificent liberality of John Lytle, Esq., who appropriated the large sum of £1,000 towards the memorial, should be an incentive to others to co-operate handsomely in discharging the remaining liabilities. With this view, therefore, members of the committee will shortly wait on non-subscribers, and we are sure their visit will meet with success.

COMPETITION WALLAHS.

SUCH are the attractions of the Indian Civil Service that some 200 youths compete every year for fifty appointments on the average. An Indian journal remarks that of 557 names in the Bengal Civil List, 235 are Haileybury men, and the remainder are those who obtained their positions by competitive examinations. The way in which these competition wallahs, as they are termed, are employed, is illustrated by eleven examples:—

Name.	Actual Service Yrs.	Actual Service Mths.	Last Appointment.	Annual Salary, £.
W. Cornall, B.A.	11	1	Offg. Judge of Rungpore	2,640
H. J. Reynolds, B.A.	10	6	Offg. 1st & 2d Magistrate	2,299
C. U. Atchison, M.A.	10	10	Offg. Foreign Sec., twice	3,300
R. M. King, B.A.	11	8	Dep. Commissioner, 2nd grade	2,000
J. G. Cordery	11	11	1st Assistant to Resident of Hyderabad	1,984
T. H. Thornton, D.C.L.	12	3	Secretary to Punjab Govt.	3,000
Henry Bell	10	8	Offg. Legal Remembrancer	2,640
H. E. Perkins	11	4	Dep. Commissioner, 3rd class	1,590
J. D. Sandford, B.A.	11	9	Registrar, High Court, North-West Provinces	2,000
W. B. Jones	10	9	Dep. Commissioner, 2nd class	2,000
W. L. Heeley, B.A.	10	3	Offg. 1st grade Magistrate	2,290

All are above the average, almost all are men of mark, and several are of the very highest promise. Dr. Gull, the medical adviser of the Commissioners, remarks:—"It has been forced upon me that superior physical health and strength are generally essential to success in these competitive examinations," and reports that 295 of the candidates showed an unexceptionally healthy development of frame, 121 manifested moderate or mean strength, and only 52 were "inclined to be weak." The mean height was above 5 ft. 9 in. The status of the candidate's health was higher after the second than on the first examination. But one evil still requires to be removed to make the system of competition completely successful. In order to secure something more than mere cramming, it has been suggested that every candidate should be required to have attended a recog-

nised public school for at least three years, or a University for two years. Of the 284 candidates who went up in 1865, more than a-half, or 154, had been at no University. Of the 54 who passed, 14 had been at no University, while 12 were from Oxford, 5 from Cambridge, 7 from Trinity College, Dublin, 4 from Edinburgh, 4 from the other Scotch Universities, 5 from the Queen's University, Ireland, and one from a colonial or foreign University. This was, we believe, recommended by Bishop Cotton, and for the additional reason that a public school or University education tended to develop and secure those manly virtues which an Indian career emphatically demands.—*Broad Arrow*.

NEW PATENTS.

TRAMWAYS, WHEELS, AND CARRIAGES.—An invention patented by Mr. Wm. McAdam, of Glasgow, has principally for its object the facilitating and simplifying of the omnibus traffic of large cities, but the improvements comprised in it are also applicable otherwise, and they relate to tramways, wheels, and carriages. The improved tramway is composed of wrought iron, malleable cast iron, or steel plates or rails laid in shallow grooves formed for them in the roadway, whether such roadway is paved with stone or wood or is macadamised. The tramway plate is 5 in. broad, with a horizontal surface 3 in. broad on one side, and a horizontal surface 1½ in. broad on the other, the latter being three-quarters of an inch higher than the former, whilst an ogee curve between the two occupies the remaining half-inch of the breadth. These precise dimensions may be varied, provided that similar proportions are retained. The thickness of the plate is optional, and the underside may be variously shaped, but it is preferred to make it more or less concave or indented, to fit upon a seat or bed strip of preserved wood or other suitable material. When the roadway consists of stone or wood blocks, it is preferred to fix the plates down by means of split spikes entered into holes bored for the purpose through the blocks, the spike fangs being spread at the bottom by being driven against a metal ball previously dropped into the hole. The plates are to be laid with the higher surface about level with the tops of the adjacent paving stones, so that the lower surface will form the bottom of a shallow groove. This groove is intended for omnibus or other wheels of the common kind. The improved wheel is formed with what may be termed a stepped tire, that is, having one part of one diameter, and the other part of a greater diameter. The part of smaller diameter is for running on the raised surface of the rail, and the larger part acts as a flange to keep the wheel on the rail. The larger part is not as much larger as to touch the lower surface of the rail, but it is broad enough for the wheels to run upon it without injury or inconvenience when on ordinary roads. The improvement in carriages is more particularly adapted for omnibus carriages for tram or railways, and consists in making the body of the carriage separate from the frame or bogie which rests immediately on the wheels, and in arranging the parts so that the body may be turned as on a turntable. This will admit of the body of the carriage being turned round at the end of a transit without having to turn the bogie or wheel frame.

MACHINERY FOR MAKING BRICKS.—Mr. Joseph Burdett, engineer, of London, has patented an invention which relates to certain mechanical arrangements for dividing or cutting the clay as it passes from the die or exit aperture of the moulding machine into bricks of the required shape and dimensions. It is unnecessary to describe the general nature of the machinery to which these improvements are applicable, as the same is well known and understood, and the present invention refers only to the particulars herein mentioned. When a sufficient quantity of clay of the required sectional area has been ejected from the die or exit aperture of the machine on to the roller table hereinafter mentioned, and with which the machine is provided, it is cut off by means of a horizontal wire or blade, which is passed up through the same close to the die or exit aperture, such wire being arranged so as to slide up and down in guides attached to the machine, and actuated by a suitable lever, which is provided with a drop latch for the purpose of dropping into a segment plate to hold the frame carrying the wire ready for the next cut downwards. The required length of clay having been cut off, it is moved from the horizontal wire upon the rollers of the roller table on to a moveable rack plate table. The last of such rollers preceding the rack plate table works in a chamber or trough, which is partly filled with oil or other lubricating material, which greases or lubricates the under side of the clay as it passes on to the moveable rack plate table in order to prevent any adhesion thereto. On

one side of and above the rack plate table, but not attached thereto, are placed the standards of the machine, and a stationary side or resistance plate to hold the lengths of clay fixed during the operation of cutting. Series of cutting wires or blades are fixed to a moveable rack frame, the same being distant from each other about the thickness of a brick, and are made to pass through the clay to the side or resistance plate by means of a lever and segment of a wheel working in the rack frame underneath. On the rack frame, and immediately before the cutting wires or blades, is placed the moveable plate table, which is capable of being actuated by a suitable handle, and on which the lengths of clay are laid ready to be cut, and behind the cutting wires is the receiving board. At the same time that the wires or blades are cutting or passing through the fixed clay, the rack plate table is moved from underneath and passes the receiving board under the newly cut bricks, and on the return stroke of the table takes the bricks to the one side upon the receiving board ready to be lifted off, and leaves the rack plate table ready for the next length of clay to be cut in like manner.

PLANING, BORING, AND SLOTTING.—This is an invention (which has received provisional protection only) by Messrs. Charles Scriven and William Holdsworth, of Leeds. It relates to improvements in the arrangement and construction of machinery for cross planing in combination with apparatus for boring and slotting, such apparatus being adapted for being employed in mechanical operations required for the construction of marine engine beds, and other parts of steam or other engines or machinery, or where the parts to be operated upon are of considerable magnitude, the object being to keep large bodies of metal fixed and stationary whilst being operated upon by a travelling cutting tool. This is effected by the tool-holder traversing the cross slide by means of screws or other appliances, being self-acting and adjustable to any length of stroke within the range of the machine. The body to be operated upon is fixed on the table or bed-plate of the machine, which is self-acting longitudinally as an ordinary planing machinery, and can be so used; by this means all parts to be operated upon are brought within range of the several tools required for each operation. The cross-slide has a self acting feed downwards on the face of uprights, so as to be able to plane or slot across the ends of the piece of machinery to be operated upon. The object of this combination of machinery is to afford facility for completing large pieces of machinery by means of one fixing, thus insuring all parts which are planed, bored, and slotted being perfectly true with each other, such combined operations being accomplished at considerably less cost than by machinery such as at present employed for these purposes.

DIOCESAN ARCHITECTS.

In the course of the debate on the Irish Church Bill, Mr. Brodrick said he had placed an amendment on the paper in order that justice might be done to a very small and deserving body of men, the diocesan architects, who were appointed under the 14th and 15th Victoria, known as Napier's Act. The bishop appointed one in each diocese, and their duty was to superintend all the alterations of the glebe-houses, to make periodical inspections, to report on the repairs necessary, and to see that those repairs were properly completed. They were, indeed, such useful functionaries that he wished there were similar ones on this side of the water. There was no provision in the Bill for compensating these officers for the extinction of their employment. He had added the words "or emoluments" after "salaries," because they were not paid by definite yearly salaries, but by a commission on the repairs they had superintended. One gentleman, who had filled this office for fifteen years, told him that his professional earnings from this source for the last three or four years had exceeded £100 per annum. These offices would not be continued because, as the glebe houses fell in and were purchased under the Bill, they became the property of the Church body, which need not employ diocesan architects unless it chose to do so. He moved, page 6, line 27, after "benefices," to insert "the amount of yearly salary or emoluments which any diocesan architect appointed under the provisions of the Act of the 14th and 15th years of Victoria is entitled to receive."

The Attorney-General for Ireland said that these compensation clauses had been con-

sidered with care, and it was found impossible to extend compensation to every case and circumstance. In this particular case, the claims of those officials who called themselves diocesan architects would not be recognized, because there were no such officers. The diocesan architects had constituted themselves officers, but there were no such officials known to the law.

The amendment was negatived.

The question has been asked in the *Builder* before now who created the diocesan architects of England? and it will have to be answered one of these days, with particulars as to what circumstances led to their appointment, and what use they have made of their position.—*Builder*.

MISCELLANEOUS.

THE CHANNEL BRIDGE. — The following is a translation of a paragraph in the *Journal Officiel de l'Empire Français* of the 16th ultimo:—"The project of a bridge over the Straits makes each day further progress. The first model was completely finished some days ago, and is perfectly satisfactory. This small model is composed of a single arch, reduced upon an exact scale to the hundredth part of the size of one of those of the great bridge. It presents an absolute rigidity throughout; that is to say, it is not subject to any movement or oscillation. There is consequently no vibration calculated to disintegrate the metal. There is no more elasticity perceptible under foot than in walking on a pavement, and it can support without deflection a weight greater than twenty trains proportioned to the same scale, meeting in the middle of the arch. The weight of ten men does not produce a deflection of more than a few millimetres in its whole length, and as soon as it is relieved of its burden it recovers exactly its first position—indeed, it was not necessary to employ several of the parts prepared to ensure rigidity. This result simplifies the question, and permits considerable economy in the cost. A second model of a size double that of the first is on the point of being completed, and if, as everything tends to show, the result is as favourable, the most sceptical will be unable to entertain the smallest doubt in respect of it. In any case the problem is solved that bridges and viaducts of every size can be constructed in a single arch without piers from bank to bank. Already many orders for large and small bridges have been given; among others a large bridge with a road and railway of a kilometre in length, which will unite St. Malo and St. Servan to Dinard, a foot bridge of 100 metres over the basin of the lock of Calais, and several others for the departments."

A very fine set of casts from the antique has just been added to the collections in the School of Art of the Royal Dublin Society, which is now, perhaps, richer in this respect than any other School of Art in the United Kingdom. The new casts were selected by Mr. Edwin Lyne, and are chiefly reproductions of antique examples in the British Museum. One in particular is worthy of attention—a cast of the head of Apollo, recently purchased for the British Museum at a cost of £2,000, and formerly belonging to the Pourtales collection. This beautiful head is the finest in Europe, and this reproduction is, we believe, the first that has reached this country.

A Concrete Pavement, which is called the "Patent Adamantean Concrete Pavement," is being laid in Great Carter-lane, near St. Paul's Cathedral, for the corporation of the City of London. The patentee claims for it that the mud, dust, noise, and wear of vehicles, are reduced to the minimum; that the heat or cold of this country will not affect the material; that it is non-absorbent, so that there will be no tendency for water or other impurities to enter from above, and the pavement can be washed down as easily as the deck of a ship. Time will show.—*Builder.*

The shutter of a New York cheese and butter store recently bore this unique placard—"Closed on account of the sheriff."

The Central Pacific Railway works, to protect the line from the heavy falls of snow to be expected in certain sections, consist of a shed covering, twenty-two miles in length. This shed is sixteen feet in width, and sixteen feet in height, not including the pitch of the roof. The sides are enclosed, and were it not that daylight penetrates through the interstices, the whole would be like a huge tunnel. The building is braced together in a peculiar manner, and is, in addition, firmly bolted to the rocks near the face of a cliff. Where snow-slides are to be feared, an extension of the roof has been carried to the cliffs, so that falling masses shall pass over the building, and lodge upon the other side.

An energetic grocer of Plaistow has recently given away to his customers, amongst other articles, a perambulator, a clock, and an easy chair. One week he presented 5,600 ounces of tea, in quantities of one ounce each to every purchaser of a quarter of a pound of 2s. 6d. tea.

"SPECIFYING" IN CRIMINAL PROCEEDINGS.—At the Birmingham sessions, the other day, two thieves escaped punishment because the recorder ruled that articles described in the indictment as "deal boards fixed to a building" should have been described as "woodwork belonging to a building."—*Builder*.

OIL AMONG THE ANCIENTS.—The ancients knew no method of refining oil. As a great luxury, they mixed it with perfumes, such as essence of roses and sandal-wood; but this rather detracted from than added to the burning properties of the liquid, and all that was obtained by the process was an increase of fragrance and a diminution of light. The dwellings of wealthy men like Verres, Mæcenæ, and Lucullus, who expended extravagant sums upon scented oils, would not have borne comparison, in point of lighting, with the grimest tap-room of a gas-lit public-house. The gold and silver lamps, hung by slender well-wrought chains to marble pilasters, only yielded at their best a lurid tapering flame, that gave out an enormous deal of smoke, fluttered in the slightest breeze, and went out altogether at a gust of wind. Neither was it possible to steady the light by closing the apertures through which the air came; for, had Roman or Grecian houses been possessed of glass windows, they would soon have become uninhabitable. The fresco paintings of Pompeian villas, the delicate colours on the walls of urban palaces, would in less than a month have been hopelessly coated with lamp soot. At the end of an hour's conference of an evening, a party of noble Romans would have resembled a congregation of chimney-sweepers. A tunic dyed in Tyrian purple would have acquired a mournful hue in no time.—*All the Year Round.*

The new Wesleyan church at Ferrybank, Arklow, was opened on Wednesday last. It is a neat and commodious structure, and was erected, from plans by Mr. William Fogerty, architect, by the Messrs. Beckett, contractors. The cost was about £1,250.

VOTES OF MONEY FOR IRELAND.—The following votes were taken on account in Committee of Supply on Tuesday:—Ulster Canal, £5,000; Lord Lieutenant's Household, £1,500; Chief Secretary's Office, £4,000; Boundary Survey, £2,000; Charitable Donations and Bequests Office, £500; Agricultural Register Office, £3,500; Poor Law Commissioners, £16,000; Public Record Office, £750; Public Works, £4,500; Law Charges and Criminal Prisons, £14,500; Courts of Chancery, £7,500; Common Law Courts, £5,000; Court of Bankruptcy and Insolvency, £1,500; Landed Estates Court, £2,000; Probate Court, £2,000; Registry of Deeds, £2,500; Admiralty Court, £500; Registry of Judgments, £500; Dublin Metropolitan Police, £16,000; Constabulary, £151,000; Government prisons and reformatories, £13,500; county prisons, £1,500; Dundrum Criminal Lunatic Asylum, £800; Four Courts Marshalsea, £400; miscellaneous legal charges, £1,500; National Gallery, £500; Royal Irish Academy, £300; Queen's University, £1,000; Queen's Colleges, £700; Belfast Theological Professors, £400; Non-conforming clergy in Ireland, £700; hospitals and infirmaries, £3,000; miscellaneous charges, allowances, &c., in Ireland.

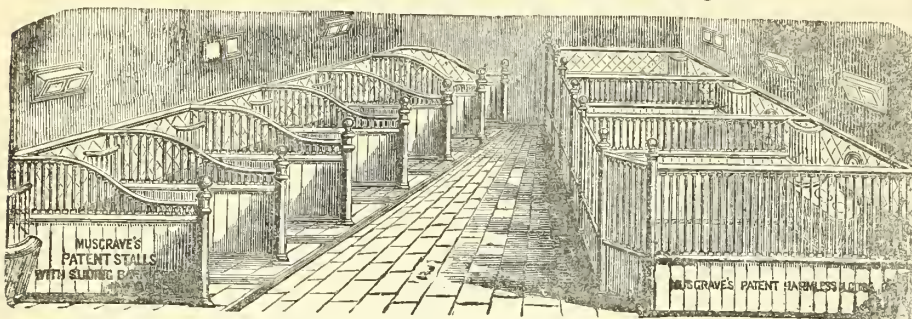
GOLDSMITHS' WORK—The progress of fine art manufacture in this branch of trade is strikingly exemplified in a little work published by J. W. Benson, of 25, Old Bond Street, and of the City Steam Factory, 58 and 60, Ludgate Hill. It is enriched and embellished with designs (by Italian, French, and English artists) of Brooches, Bracelets, Earrings, and other articles, suitable for personal wear, or Wedding, Birthday, or other presents, with their prices. Mr. Benson (who holds the appointment to H.R.H. the Prince of Wales) has also published a very interesting pamphlet on the Rise and Progress of Watch and Clock-making. These pamphlets are sent post free for two stamps each, and they cannot be too strongly recommended to those contemplating a purchase, especially to residents in the country or abroad, who are thus enabled to select any article they may require, and have it forwarded with perfect safety.

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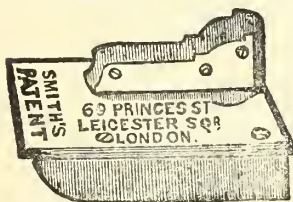
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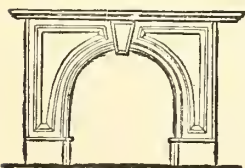
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TESTIMONIALS.

From WILLIAM TITE, Esq., M.P. for Bath, and Architect of the Royal Exchange, London.

House of Commons, 2nd March, 1864.

DEAR SIR,—In reply to your note, I beg to say that I have used both the sorts of Cement manufactured by your firm, and that of Messrs. Francis and Son; I mean the Cement usually called Roman Cement, or the more recent introduction of Portland Cement. I believe these Cements, manufactured by either of your firms, to be equally good. I know no difference, chemically or practically, between them; and I should use, and authorize to be used indifferently, either one or the other. You are at liberty to use this note, if you think it necessary.—I am, Dear Sir, your obedient servant,

Messrs. White & Son. (Signed) WILLIAM TITE.

From R.O. MINNIE, Esq., Surveyor to Board of Ordnance, London.
War Office, Pall Mall, London, S.W.,
3rd March, 1864.

GENTLEMEN,—In reply to your request, I have much pleasure in stating my favourable opinion of the quality of your Portland and other Cements, which have been extensively used in the Public Works connected with the War Department at home and abroad, especially in several of the fortifications now being erected in this country. On all occasions within my knowledge the quality has been equal to that of any other manufacturer, and has given great satisfaction.—I am, gentlemen, your obedient servant,

(Signed) R. O. MINNIE, Surveyor.

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The Irish Builder.

VOL. XI.—No. 227.

Law and Architecture.



TWO actions, of some importance to the architectural and surveying professions, have just been decided at the Easter after-sittings in the Court of Common Pleas;—we allude to the cases of *Taylor v. Hall*, and *Fogerty v. Walsh*. A short notice of the former appeared in our last issue, and we give an extended report of the latter in our present number. The recent failure of justice in another important and well-known case—which ended, after a trial of unusual length, in a disagreement of the jury, brought about by the sinister conduct of two members of the profession, who appeared to give evidence against the rules of practice and charge they had themselves solemnly subscribed—has led many to conclude that no justice was to be obtained by an architect in our courts of law, and that no rule existed by which the remuneration due to his services was to be measured. Architects, at least those of any position, are generally men of refined and cultivated tastes, to whom scarce anything is more disagreeable than to have to appear in court; and they commonly prefer to let an unprincipled client escape with his ill-gotten gains, than resort to the tardy and uncertain remedy afforded by our time-honoured constitutional tribunals. Clients of the class above mentioned know this, and invariably stand out against all offers of reference or arbitration, which no honourable man would refuse, and too often succeed thus in mulcting the intellectual labourer of his moderate and well-earned hire. An additional element of discouragement is the melancholy consideration that there are always to be found real or professed members of the profession who, whether to curry favour with the public, or from wretched motives of jealousy, or whatever cause, are ready to aid in resisting any claim of a brother architect, however just and well-founded. The Architectural Institutes of Dublin and London have had this painful fact forced upon them recently, as noticed in their published reports, and will sooner or later have to deal with it in a more decided manner than has yet been done.

Occasionally, however, a case arises in which an architect must either go to law, or submit, not only to pecuniary loss, but also to wide-spread aspersions upon his honesty and professional skill. One of the cases to which we refer—*Fogerty v. Walsh*—is of this class, and the result obtained is eminently satisfactory as not only vindicating the character and claims of the plaintiff, but also establishing a useful precedent, as the verdict was given in accordance with the terms of the Institute scale of charges, which no longer can be said to lack recognition in our courts of law, and which, both as an equitable and legal standard for the adjustment of architects' claims, must in future command respect. The defences set up were twofold—one a very common complaint, viz., "that the architect had exceeded his instructions, and prepared plans far too expensive for his client." This, however, was soon exploded by the documen-

tary evidence, which showed that at the outset of the proceedings the architect had submitted a preliminary plan and approximate estimate, which the client had never objected to, but enlarged upon; and that an offer had been made by the builder to carry out the work even on the enlarged plan for the sum named. Even had there been some discrepancy between the architect's approximate estimate and that of the builder, this, as ruled by the court, would not justify a client in refusing to pay anything to the architect. The remarks of Chief Justice Monahan on this subject were most apposite. "The common law of the country," said his lordship, "is simply common sense, and requires an architect to exercise a proper and reasonable skill and judgment in carrying out his instructions and preparing his estimates and plans. But an architect is not a builder; and because he may have approximately estimated a certain work at a certain sum, cannot be bound to have it carried out for that exact amount to a sixpence, or else forfeit his remuneration. Moreover, if a client, after the receipt of a plan and estimate, chooses to enlarge upon or increase it, giving further directions to the architect, this obviously supposes an increase in the estimate, and the architect cannot be held to be any longer bound by it."

The second defence was one of most peculiar character, and one of which we opine the able and learned counsel for the defendant was heartily ashamed on the part of his client, as he did not once allude to it in his address to the jury, nor was it noticed further by the judge. It was "that the plaintiff was bound to superintend the work, but that he became ill and unable to do so, whereby the plans, &c., became useless." If this principle is to hold good, it is high time for architects to form some peculiar sort of insurance company to guard themselves or their families from the possible loss of the fruits of their labours on every work in which they may be interrupted by illness or death. They are no way exempt from the common ills of humanity—in fact rather more liable to accident than other men; and the doctrine sought to be established by the defendant in this case, if allowed to remain unchallenged, is most alarming. It means this, that if an architect at any time during the progress of a work (and many buildings occupy years) falls ill, meets with an accident, or dies, all his previous labour on that work is to go for nothing. For at what particular point are we to draw the line? The plaintiff in this case had prepared all the drawings, specifications, and details, so that nothing remained but to inspect the work, when he is overtaken by sudden illness, and the defendant coolly tells him that as he could not perform the whole duty, he is to get nothing for the greater part which he had performed. On a similar principle the late Sir Charles Barry or his executors ought have got nothing for the design and superintendence of the Houses of Parliament, as he died before that great work was complete. Defendant must have calculated strongly on the disinclination of his opponent to bring matters to an issue, when he could enter such a monstrous defence as this. Unfortunately for him it was proved that the plans, so far from being useless, were turned to good account, as the work was executed virtually in accordance with them. The verdict shows that, after all, substantial justice is still to be had from a Dublin jury, especially when under the direction of such a sound and sensible

judge. We congratulate Mr. Fogerty on this dear-bought victory, which, though relating to a small sum, is most important in the principles established, and will prove a useful precedent. We are glad to see him restored to health, and pursuing his profession with undiminished energy and resolution; and we wish him every success in the more extended field of the British metropolis, to which we understand he is about removing to practise in conjunction with his brother, who is already well known and established there.

The other case—*Taylor v. Hall*, which arose out of the same transaction—is also of great importance to the respectable profession of building surveyors, and gave occasion to the same learned judge to give a most valuable exposition of the law as regards that useful class of men and their employers. The facts were as follows:—When tenders were required for the works already mentioned, the architect employed Mr. Taylor, surveyor, to prepare the quantities, and a circular was issued to each builder, informing them that they would be supplied with the bills of quantities by him, "to be paid for by the party whose tender might be accepted, in the usual way." To this each builder, including the defendants, Messrs. Hall, returned answers agreeing, and accordingly copies of the quantities were sent to them, and tenders duly sent in, that of Messrs. Hall being the lowest. As this was considered too high, a "bill of reductions" was prepared by Mr. Taylor under the architect's direction, when, after some delay, the proprietor (Mr. Walsh) announced his intention of abandoning the work. Mr. Taylor then, with the sanction of the architect, sent in his account to the proprietor, and it being repudiated, was about bringing an action against the latter for the amount, when he discovered that the work was not abandoned, but actually being carried out on the same plans by the Messrs. Hall, under an arrangement made without the cognizance of either the architect or himself. He then, as advised, brought his action against Messrs. Hall, relying on the original arrangement, and, as the result has proved, with success, the full amount being awarded to him. In the course of the trial several architects, surveyors, and builders of eminence were examined, and proved that the usage was for the architect to employ a surveyor to prepare the quantities, whose fees were to be paid by the builder who got the work, or any modification of it; but in case of the total abandonment of the work, his fees should be paid directly by the employer. This usage and its reasonableness were fully recognized by the Chief Justice, who remarked as follows:—"The service rendered by the surveyor is undoubtedly for the employer's interest, and as he is employed by the architect, who is the agent of the employer, the primary liability is against the employer. The usage of the trade, by which this liability is transferred to the builder who gets the work, or any modification of it, does not alter the fact that it is still the employer's money pays for the service, though the surveyor gets it through the builder. It is like the duty on tea, which, though paid by the wholesale grocer, still must eventually be paid by the consumer. This fee is usually charged at the foot of the builder's estimate, or else, as has been proved is sometimes done, a proportionate increase made in the prices throughout to provide against it. It is no hardship, therefore, on the builder to have to pay it, as there is no

compulsion on him to tender or sign a contract, and he can take care in doing so that this item is fully provided for. Should, however, the employer abandon the work and accept no tender, as there is then no builder to whom the surveyor can look for payment, the employer becomes directly liable."

It was urged on behalf of the defendants, that in their contract with Mr. Walsh a clause, we must say of a most extraordinary kind, was introduced, that "they were not to be liable for either architect's or surveyor's fees." This, however, as was ably put by the counsel for the plaintiff, being long subsequent to the agreement to tender and supply of the quantities, with the clear understanding that they were to be paid for by the builder, and being, moreover, entered into behind the backs of both surveyor and architect, could only be looked on as a collusive attempt to evade the surveyor's claim, and, however it might affect the adjustment of accounts between the employer and builder, could not affect the liability of the builder to the surveyor. The latter had been long enough played "battle-dore and shuttlecock" between the employer and the builder, and now looked to the latter for the amount of his honest claim, in accordance with the arrangement and custom of the trade. The verdict was for the full amount, being 1½ per cent. on the gross amount of the estimate, besides lithography, and a charge of £12 for making out the bill of reductions already referred to—total £45. Mr. Taylor, who is a young and rising practitioner, deserves great credit for the courage with which he brought this matter forward against formidable opposition, and we trust will in future receive his well-earned fees without having to undergo the hardship of legal contests.

ROYAL INSURANCE BUILDING, DAME-STREET.

A VIEW of the new premises just completed for the Royal Insurance Company forms the subject of our illustration with the present number. Many of our readers have, no doubt, seen and admired the building on their passage through Dame-street, to which it adds a very striking and prominent feature on its northern side.

The building, which is of Portland stone, stands at the junction of Fownes-street with Dame-street, presenting to the latter a frontage of 46½ feet, divided into three bays, and to the former of 42 feet, in two bays. These bays are divided from each other by a splayed angle, in which is placed the principal entrance. The jambs and head of doorway are formed of Irish marbles, red, green, and black, richly moulded, carved, and polished. In the tympanum are shields bearing the arms of the company—the "Liver" being the most prominently shewn in the carving thereon.

Ascending by a flight of five steps the principal office is reached through a porch composed of Riga oak French polished, having beautifully carved pilasters on the interior, supporting an entablature bearing an ornamental canopy with arms of the company carved thereon, standing on a moulded pedestal, cap, and base mouldings continued round inside of porch. The two upper panels of door are glazed with polished British plate glass, and the two lower raised solid panels having bold mouldings. The counter and other office fittings, including two double desks, are of Spanish mahogany French polished. The counter front is divided into bays of 4 feet 6 inches each. The bays are formed of richly-carved pilasters on face, with brackets over same supporting counter. The full bays are subdivided into two panels, with semicircular heads moulded and divided by small pilasters, having moulded caps and bases. The top of counter is of one piece of mahogany 2 feet 8 inches wide and 18 feet long.

The principal office is 28 feet square, and 20 feet in height. At one side of this office

are manager's office and strong room, and staircase leading to the board-room over same. The plaster work in centre piece, and spandrels in principal office, as well as the carved work on the exterior of building, are well worthy of critical examination. They are treated in a masterly style; we shall always feel pleasure in recording the carrying out of works which, like this, will bear a strict and rigid examination of even the most minute details. The upper floors of the building (to which we may observe, there is a separate entrance in Fownes-street) is devoted for the purpose of letting as offices. The architect was Mr. Wm. G. Murray, Lower Gardiner-street. The contractor was Mr. John Nolan, Meredyth-place.

We understand that the "Royal" has made more progress both in their Life and Fire business than any company yet established. We, of course, do not intend to present any figures to our readers; the numerous agents of the company will supply all information to those wishing to insure.

THE ROYAL INSTITUTE OF THE ARCHITECTS OF IRELAND.

THERE was an ordinary general meeting of the Institute on Thursday evening, 20th ult., at its rooms, 212 Great Brunswick-street,

PARKE NEVILLE, C.E., V.P., in the chair.

Mr. James H. Owen, M.A., Fellow, Hon. Sec., read a paper on "Labourers' Dwellings for Ireland" (which will be found on page 129).

The following recommendation paper was read:—As Associate, Robert Cochran, Banbridge.

The following gentlemen were submitted for ballot, and declared duly elected:—As Associate, Francis Nolan, Student, 60 Upper Sackville-street. As Student, Wm. O'Brien Newell, A.B. and C.E., T.C.D., 52 Great Charles-street.

Mr. William Turner, Oxmantown Foundry, Nth. King-street, exhibited a most ingenious, simple, and effective pump patented by Messrs. R. Laidlaw and Son, Glasgow, for which he is agent, known as "The Patent Rotary Lift and Force Pump."

MISAPPLIED CELTIC NAMES.*

AN old Celtic name is often found to have changed its original locality to a place in the vicinity, for which its meaning is inapplicable—seemingly from the newer inhabitants of the place not understanding its meaning. Thus, very often, hills are called by names that signify some sort of valley; a few valleys are called by the names of hills; and in other places a name in some way notable will be applied to a place or thing for which it was not originally intended. *Combe* is of Celtic origin. There are two very similar common Irish words, *cum* or *come*, and *cúim*. The first means simply the waist, or the small part of the body, and from that it has been applied to the skirt of clothing, signifying in both cases something that is braced or may be braced round the waist. The second is more common than the other, and is sometimes written *ciom*. It is very common in names of Irish origin, Anglified into *kim* and *keem*. It simply means any large grassy hollow (not a valley) used as a buala or boley for cattle. The *kim* is generally a good place for feeding cattle, and is always enclosed by heights; but it never means the heights themselves, but only the hollow or dell. The difference between a buala and a *kim* is, that the former is a place enclosed by man in which to put cattle in the spring and summer months while on the mountain pastures—a place that ensures safety; while *kim* has a larger and wider range, and although also meaning an enclosed place, yet it is one made by Nature, not by man. *Ros* has two meanings. First, any projecting point, but it does not signify whether it is into water or not. Generally, the name is applied to projections of land into the sea or lakes, but it is often

applied to other projections, such as a tongue of land extending into a bog, or a spit of good land running into crags, &c. Secondly, it means a close brushwood or coppice, but not a wood. Points of land such as those just mentioned are often covered with brushwood; and this secondary meaning for this word seems thus derived, and finally came to signify any narrow jutting-out place covered with brushwood or low timber. In a similar way *doon* has come to signify an isolated hill, as they were favourite sites on which to build forts; and *derreen* to be the name for a small drift patch or hill surrounded by bog, as in ancient times such places were oak-woods or Derrys. Of *doon*, O'Flahertie says—"It hath nothing to do with the sense of hill or height as Camden and Sir J. Ware thought; only that such as were so called were usually situated on heights." In Yar, or West Connaught (better known to English readers by the misnomer of Connemara), the names of the promontories are usually compounds of *ros*, as O'Flahertie writes—"Many lands here environed for the most part by the sea are called *Iros*, with an adjective to distinguish them from one another." Colgan translates *ros* by *promontorium*, O'Sullivan by *nemus*; and of this word O'Donovan says—"In a note from Ware's MSS. in Nomenclat. Hib. MS., by Archdall, it is translated *boscus*, and in Cormac's 'Glossary' it is interpreted as a wood. Not only in England and Scotland, but also in Ireland, the misapplication of the old Celtic names is common. A few may be given as examples, out of the many in West Galway. Oughterard is the *lower height or hill*, and this name is now given to a village on the flat, half a mile east of the hill. Maunturk, the *Wild Boars' Pass*, is the name the hills on the west of the Maun valley are generally known by. *Maun*, or *maum*, is a mountain-pass or connecting gap in a mountain ridge, derived from "Mām," the inside part or hollow of the hand, and the name of Maunturk originally was only used to designate one of the passes through which was the great road into the north of Connemara. The Irish-speaking inhabitants still use the name only for the pass, and they call the hills *Slieve-maunturk* or *Cnoc-maunturk*—the mountains or hills of the Wild Boars' Pass. Two hills east of the Maun valley are respectively called Lugmore and Lugnabrick. Now *hy* is a gloomy depression or valley in the mountains. The dictionary gives the explanation "pit," but this seems to be incorrect, for both in ancient and modern times the word is more often applied to natural hollows or cavities. In the present instances the inhabitants apply these general names to valleys in the vicinity of the hills; and when speaking of the hills themselves, they add *ben* or *cnoc*. *Derryclare*, the oak-wood on the plain or table, is the name given to the south-east hill in the group called *Bennabeola*; while the wood to which the name belongs is on the adjoining flat. Glendalough, the *glen of the two lakes*, is the name by which the lake at Recess is now known; while the glen with the two lakes, to which the name originally belonged, lies immediately to the southward. Numerous other examples might be given both in Yar-connaught and the other parts of Ireland; but one more will be sufficient—namely, Dublin, or *black pool*. This, it need scarcely be mentioned, is now the name of the capital of Ireland. Can it be possible that in memory of the origin of the name its Corporation keep this city in a pool of black filth? Wrong translations of the Celtic also cause curious names to be now given to places. A volume might be filled with these mistranslations; therefore, only two will be referred to. The old name for Phoenix Park, near Dublin, was *Finiska*, the *clear spring of water*. Lord Richmond built a monument with a Phoenix on the top of it, and thereby the name *Finiska* was changed to Phoenix. Common names now met with in Ireland are Boys-hill and Boys-road. Originally these were Knockboy and Boherboy—the *yellow hill* and the *yellow road*.

G. HENRY KINAHAN,
Geological Survey of Ireland.

* From the *Athenaeum*.

LABOURERS' DWELLINGS FOR IRELAND.*

THIS is, to some extent, the question of the day. It has become quite a mania with some people, so that it is laid down by some of the quacks who want to heal the body politic, that if you will only give the labourer a dwelling containing a living-room, a scullery for doing the dirty work and the simple cooking of the family in the summer time, three bedrooms—one for the rustic *pater familias* and the wife of his bosom, one for the boys, and the other for the girls—together with the appropriate out-offices, you will immediately erect, together with the four walls of the edifice, a model home, and exhibit to the world a model family—a father at the head of it, for whom beer has no charms, and whose loudest dissipation is quietly exhaled in a pipe of poisonous pigtail; a wife—fit companion of such a model man—who never scolds, and who has always the well-swept hearth and kindly welcome for her returning spouse, and boys and girls to match. Every one has seen these pictures, and most of us have, from time to time, admired them, but chiefly, I think, because we have never looked closely into the reality. It is my own deliberate opinion that they are based on an exaggeration of the real wants and necessities of the classes in whose behalf they are entertained, as gross and extreme in the direction as the reality of the miserable hovels which have been their original exciting cause as in the other. I also have very little sympathy with the theory of the degradation of moral tone from over-crowding of which so much is made by moralists and philanthropists. I think there is both exaggeration in statement of the extent of the supposed results, and also great want of discrimination as to the real causes of the evils they lament over. The great cause of demoralization is, to my mind, not the rather tight packing of members of the same family, but the habitual sharing of a tenement, barely sufficient for the comfortable accommodation of one family, with lodgers, who, from the nature of the case, are not under the control of habit and use (to put it in the lowest term) which govern the intercourse of the family, and by intercourse with whom familiarity easily degenerates into vice; but if the labourer with one or two rooms is liable to fall under the temptation of exposing his family to this risk, how can he be supposed to withstand it when you expand the accommodation at his command to three or four rooms? and almost force him to detach the greatest safeguard to morality—the tone of family life—by an infusion of aliens. We are too apt, when considering other classes of life, to import into the consideration our own ideas; but these being based upon wants and feelings which are not attendant on the circumstances of the classes under consideration, lead us into very important errors. The days are gone by for shepherds and shepherdesses *à la* Watteau. We must put ourselves into the position of the class, think their thoughts, realize their habits, feel with them as well as for them, before we can be in a position to be of any real service to them; above all, we must put out of our heads and out of our hearts all ideas of converting their position into a sort of genteel poverty. Most of the efforts now being made for the labourer's benefit are simply absurd, as far as the matter of lodging him is concerned. People build houses which the labourer cannot furnish, which his wife cannot keep clean, and which, as philanthropy is closely related to economy, is run up of such material, and in such a way as to be eternally in want of repair—thanks to ill-seasoned timber and “Brunnagem” ironmongery,—and then he is condemned for want of gratitude, industry, and resource of any kind, because his landlord, to his own loss, has provided him with an ill-suited gimcrack. Now, if Paddy were in want of a suit of clothes, and you went to Hyam's or Moses' and fitted him with a suit of “our

superior tweed at 36s.,” you might as reasonably expect that it would be as warm, impervious to wet, and durable as the frieze and corduroys put together by the village tailor, as that the philanthropic labourer's cottage would suit the man, or the man it.

I think it will not be amiss, before going further, to give some illustrations of modern inventions and devices in cottage building. At a very early stage of the movement it struck men's minds that such miniature palaces as the model cottage of the Prince Consort were only possible when a landlord could afford and was willing to put them up, regardless of return in the shape of interest for his outlay, because the small rent which alone could be collected from the labourer, whose wages would average 15s. per week, would be wholly swallowed up in the art of mere maintenance; and it is well known that this is a class of property which, to be at all remunerative, requires a return of at least 12 per cent. on the cost of building. To meet this difficulty, various attempts have been made; in some the materials have been reduced in quantity and quality to an extent that any durability at all falls little short of a miracle; in others the size of the rooms has been reduced until the minutest subdivision of space, originally very restricted, reminds one of nothing so much as the cabin of a ship, the attempts to ventilate which would make coughs, colds, and rheumatics permanent endemics, were it not for the beautiful provision of Nature which always supplies an old hat or some other easily-applicable remedy to the evil. But the necessity of the case has brought out some really remarkable inventions. A Mr. Tall, in the neighbourhood of London, has proposed a scheme for superseding brickwork for walls and the ordinary materials of roof and floors, by concrete made of Portland cement and small stones or burnt earth. This process is very ingenious. After marking on the ground the outline of the proposed house, he sets up a framing of planking, protected from the adhesion of the concrete by zinc plates, and bolted together through the thickness of the proposed walls. He proceeds to fill in with concrete to the height of the first course. The frames are then shifted, and the next course is filled, and so on until the walls are completed to the height required. Then it is only necessary to plug up the holes where the bolts were with concrete, and smooth over the surfaces inside and outside with fine cement, or mortar inside, and the walls are finished. Doors and windows are inserted as the work proceeds by inserting the frames with a sheeting of timber round them, which is removable, and the concrete is filled in all round, leaving the frame in its place sealed in the wall, and the opening neatly framed with its jambs and lintel complete. Floors can be either formed of boards and joists in the ordinary way, or, what is of course better, of concrete, finished on the surface with a fine stuff; and for upper floors, varying from 6 inches in thickness, in proportion to the length between the supporting walls. Roofs, again, may be of any material; but he recommends a sheet of concrete, either flat or slightly arched on the under-surface, and raised in the centre on the upper surface to throw off the water. All this seems very easy and very admirable, especially when you consider that Mr. Tall promises that the concrete shall be made and erected for about 5s. or 6s. per cubic yard, when brickwork costs about three times as much, and that a wall of concrete 9 inches thick is a perfect non-conductor of heat, moisture, and sound—in all of which respects a 9-inch brick wall fails most signally—and that it is dry and fit for occupation within a day or two of completion. But there is a reverse side of the picture. In the first place, if the cement be not of the best quality, and most carefully used by persons experienced in its use, so far from having a strong wall, you will have a very weak one indeed, as was proved by one of Mr. Tall's own structures, which came down by the run while in process of erection, partly, it must be owned, from sheer ignorance of the first principles of building—as if you were to try

and balance a card on its edge,—but chiefly from the inferior quality and unskilful use of the cement. Next, there is a little error in Mr. Tall's calculation of cost. In his data he assumes that, say four measures of crushed stone, or gravel, or burnt earth, mixed with three measures of sand and one measure of cement, with a due proportion of water, will make eight measures of cement, whereas, in fact, the cement and water enter into the interstices of the sand; this mixture packs itself into the spaces between the particles of stone or other material, and the result is a mass of about five measures of concrete. Another element of cost is not brought as prominently forward as it should be—viz., that the cost of his frames and apparatus is about £100, and that this cost is to be spread over the number of cottages it is applied to, and unless that number is very large all saving vanishes. In Ireland I find, after careful calculation, that, exclusive of the cost of plant, patent-right, &c., such a mode of building would cost on the average as much as brickwork, and twice as much as masonry, so as to be wholly inapplicable on the score of economy, and in another respect wholly unsuited to the climate, because the cold, hard surface of the cement would be always condensing moisture, and the house would be like a well unless such fires were kept up as would keep the walls always at a high temperature. Every one must have noticed the dreary, cold, miserable appearance of the black stone flags which are in such common use in Dublin; fancy yourself and family compelled to live and sleep in rooms floored, ceiled, and walled with slabs of similar material, and you will realize the appearance of one of Mr. Tall's patent rooms on a soft day in this country. I think every one will freely acknowledge that, while it was not cheap, it was certainly very nasty.

(To be continued.)

STAINED GLASS.

A WINDOW of stained glass has just been erected in the Catholic Church at Raheny, Co. Dublin. It is the window over the altar, and it is not too much to say that, both in design, color, and execution, it is well worthy of such a position. It would be difficult, we imagine, to surpass it in excellence. The main figure is our Lord with the Sacred Heart; the other two being the Blessed Virgin and St. Patrick. The window is a memorial one, and an inscription at the base records—

“✠ Of your charity pray for the repose of the souls of Richard Kelly, F.C., J.P., of Manor House, Raheny, Esq., who died on the 25th December, 1866, and of Catherine, his wife, who departed to our Lord on the 6th of November, 1867. Pray also for the good estate of Daniel Lee, of Manchester, who has caused this window to be erected to the memory of his dear sister and brother-in-law, and of Frances Elizabeth F. Lee, his wife, and their children. A.D. 1869.”

The only drawback to the delicate beauty of the coloring and painting is a tone of green thrown over the chancel from the side windows; this we hope to see removed ere long, and these windows filled with suitable glass.

The new window is from the studio of Messrs. Earley and Powells, Camden-street Works, and reflects the highest credit on them, as indeed all their works from time to time noticed by us have never failed to do. May we ask why stained glass is so frequently sent for from abroad, when such works as that alluded to above can be had at home?

Three windows of stained glass have been erected in the chancel of the Catholic Church, Butlersbridge, Co. Cavan. In the centre light is depicted the Crucifixion of our Lord, with the Blessed Virgin and the two Marys at the foot of the Cross. The windows on either side contain full-length figures of St. John and St. Paul. The windows are the gift of Hugh Blessin, Esq., of New York, a former resident in the parish. We have not been informed of the name of the artist by whom the work was executed.

* Read at Ordinary General Meeting of the Royal Institute of the Architects of Ireland, by James H. Owen, M.A., V.P., Hon. Sec., 20th May, 1869.

THE GRILLE IN NASSAU-STREET.

In the *Practical Mechanic's Journal* for past month is continued a series of valuable papers on "Some Points of Practice in Iron Founding," written by its editor. In a peculiarly clear way he describes what he calls the "casting in or on" process. As a first example he takes "the patent secured some years ago by Mr. David Moliue for a method of producing window sashes or frames by combining wrought-iron with cast-iron," and notes the places where samples of them may be seen. The writer next proceeds (in concluding the 35th chapter of this series) to lay before his readers a description of that admirable specimen of iron work which adorns one of our leading and fashionable thoroughfares—Nassau-street. Formerly (as some of our readers may remember) a hideous pebble-dashed wall separated the College Park from Nassau-street, and by it the fine buildings and park of Old Trinity were completely hidden from the view of passers-by. The contrast, indeed, between it and that which now stands in its place, was very marked. We may here mention that the grille, so well described in the following extract, stands on a massive base of granite of an average height of about five feet over road level. The expense of this improvement, including the purchase of several houses, was borne by the College and Wide Street Boards.

It is "devoutly to be wished" that the present ruling authorities of "*Collegium Sanctæ et Individuæ Trinitatis juxta Dublin a Serenissimâ Regina Elizabethâ fundatum*" would again, after the lapse of twenty-six years, draw on their rich exchequer for the purpose of similarly improving the appearance of the side of their premises adjoining College-street.

We are glad to find that the subject has again been brought under the notice of the Municipal Council, as will be seen by a report of their proceedings given in another column. The directors of the Provincial Bank, whose new and beautiful premises are in College-street, have signified their willingness to aid the movement in every possible way, and we are certain that our fellow-citizens will not grumble if their representatives in the Corporation devote a portion of the City funds to assist in carrying out so very desirable an improvement.

With the erection of a new Carlisle-bridge, and of the statues of O'Connell and William Smith O'Brien on its north and south sides; Henry Grattan in College-green, in the space between William III. and Trinity College; besides those statues already in existence, and also the fine banks, offices, &c., contiguous, this quarter of our city will be certain to arrest attention.

We must now proceed to give the extract alluded to:—

"The other example to which we shall refer is that of the grand line of grille or railing which extends for about 1,600 feet in a straight line, and forms the northern side of Nassau-street, in Dublin, separating that from the park of Trinity College. This was designed by and executed under the direction of the writer. It consists of a succession of cast-iron perforated pilasters, of ornamental open work and work in relief, with caps and bases, and sustained by two scroll struts at the rear, at intervals of about 50 feet. These are "cramped," i.e., run with an alloy of lead and zinc, into the granite continuous base. The spaces between these are filled up by the grille, consisting of a flat wrought-iron horizontal top and bottom bar, each in one length, of upright round bars of wrought-iron, and

of the cast-iron ornaments cast on to the same, which here form structural parts of the work, as will be presently understood.

In the production of this large quantity of railing, not a single piece of the wrought-iron was ever heated or put into the smith's fire. The top and bottom bars were rolled to the right length, and punched cold—the top one with 1½-inch holes, all to let the vertical bars pass through them; the bottom one with five successive holes of ¾ diameter, and then one of 1½ diameter, alternately. The round bars were ordered in two different lengths, five-sixths shorter (about 7½ feet), and one-sixth of them longer. Every sixth vertical bar passes through both the top and bottom horizontal bars, and for 9 inches into the granite base, into which it is zinc-leaded, the lower end of the vertical bar passing through a hollow cusp, or foot-block, upon the top of which the bottom bar rests. The shorter bars are riveted cold through and at the bottom side of the lower horizontal bar, and pass through the upper one.

To prepare these bars for this, a neck and collar was cut down upon each by a suitable revolving cutter tool. All the vertical bars being prepared and straightened perfectly by hand, the one-sixth longer being mere round bars of the proper length, and the five-sixths shorter with the bottom and neck collars, were then laid into sand moulds, in batches of twelve in one "box;" and the bottom and top ornaments being moulded from hollow iron patterns, made to fit the wrought-iron pattern bars, and to keep their proper places and relative distances by means of steady pins, were then "cast on" to them. The patterns for these ornaments, after having been themselves cast from wood patterns, were well chased up. The top ornaments and then the bottom ones of each batch of 12 bars were "poured" simultaneously, and the sand was at once stripped off; the bars being all separately taken out, and the thin "gaits" knocked off, which was all the dressing these ornaments required, or, indeed, admitted of; for though cast from soft gray, Beaufort, No. 2 and Scotch Pig No. 1, they were, by reason of their small relative volume, quite chilled through. Very few broke in cooling; very few were bad castings—and these were broken off from the bar by a blow or two of a hammer, and again others cast on.

The hollow or open (as to design) halbert heads which complete the railing at top, were cast in green sand, and cored out to drop on loosely to the top ends of the vertical bars, and so admit of being zinc-leaded on to the same.

Now, to erect this railing, the vertical bars were put into position, with the bottom horizontal bar, all laid flat into a wooden framing made to keep them in position and to clamp them so, until the whole sheet was hoisted into place. All the bottom ends of the collared bars were then riveted to the bottom horizontal bar. The "cusps" being in place over the holes "jumped" into the granite base, the whole sheet and frame was hoisted up by two tackles, and the longer bars dropped through the "cusps" into the holes in the base, the ends of the horizontal bar being inserted into mortices in the pilasters, in which they were held fast, though free to expand and contract within these.

The top horizontal bar was then dropped over the tops of the vertical round bars, until it rested upon the uppermost part of the top "cast-on" ornaments. The halbert heads were then dropped over the projecting tops of the vertical bars; the vertical bars, which were in the holes in the stone base, were zinc-leaded into same; the halbert heads were likewise so secured to the tops of the vertical bars, and then that length of railing was complete. A scroll rear strut corresponding with those of the pilasters was secured at the middle of each length, so that there are thus struts at every five-and twenty feet or thereabouts. If we have succeeded in making clear to the reader the processes followed, he will have recognised how small was the amount of workmanship expended in the production and erection of this railing. In

reality it did not, upon the wrought-iron portion, amount to more than about 40s. per ton of the material.

The entire economy here was due to the application of the method of "casting on," for that alone permitted of all the other structural details being carried out.

This railing was constructed in 1843, and the writer believes that the application of the method of "casting on" was then made to grilles for the first time. It certainly was so, as far as his own knowledge went and that of the skilled moulders, &c., in the employment of his firm, who all at first expressed doubts as to the practicability of the method, alleging the probability that the ornaments would crack in cooling by contracting upon the practically incompressible wrought-iron bar and so fall off. At first it was proposed to avoid this by coating the places on the bars where the ornaments were to be applied with "clay and black wash," but this proved, as the writer expected, wholly unnecessary. These places on the bars were prepared, however, by brushing them over with chalk and black-lead powder mixed, and this was found, or thought, to make the "cast on" ornaments run rather finer and cleaner.

The line of railing itself is now as good as when erected twenty-six years ago, and is generally deemed one of the handsomest stretches of iron grille in Europe. It certainly is much better than anything that London presents.

One great advantage resulting from this method of construction is the possibility of dispensing with "leading on" the cast-iron ornaments as commonly practised.

So put on, every lead collar is an electro-negative galvanic element, increasing the tendency of the iron to rust, and causing the corrosion to be local and locally powerful. With many designs it would be practicable to dispense with the use of "cramping" or leading altogether. With that we have described this might have been done, at a little greater expense.

The writer, however, had proved experimentally that an alloy of zinc and of lead may be formed, whose galvanic relations to iron are much more nearly those of zinc itself to iron, than those of lead to that metal, and in fact such as not to cause any fear from its local increase of corrosion on the iron of railing.

This alloy he adopted in place of lead, for what he has called the zinc-leading or "cramping" together, and the result has justified his experimental provisions, for after twenty-six years, and not more than four coats of dark green paint during the time, there are no signs of local corrosion whatever.

Zinc itself would be best of all as a "cramping" metal, but it runs too thick and drossy to form a close or safe junction.

In some ornamental railing recently erected at Westminster the uprights are secured without leading to the granite by iron studs and screws and by Portland cement. This is, however, a bad plan; one may say "out of the frying-pan into the fire," for the bond of the thin plate of Portland cement is certain to be broken by the expansion and contraction of the metal, and then water will find its way in by capillarity, rust will form between, this will, as usual, expand in volume as compared with that of the metal from which it has been produced; and the railing will be lifted up or the base claws broken by it, or by the expansion of water frozen between the joints which it shall have entered.

The points upon which we have here been treating are wholly those of the practical ironfounder, and of the founder in one of his humblest capacities, namely, as the servant of the architect and builder. It is to be hoped that enough has been put before the reader interested in the founder's art, however, to impress upon his mind the advantages he may occasionally derive from the method of "casting on," and to indicate the cases in which and why it should be shunned, and also some of those in which it may be employed with a value and profit proportionate to the skill devoted to its special adaptation."

A SUGGESTION FOR THE SANITARY IMPROVEMENT OF TOWNS AND DWELLINGS.

(Continued from page 115.)

THE remedy for an evil which comes home to every one who frequents a town, whether he be a resident or not, seems to be to provide a *free escape* for the sewer gases into regions where they cannot be any longer injurious to man; and this would seem to resolve itself into—firstly, *public precautions for the relief of the street mains*; and, secondly, *private precautions for the relief of domestic sewerage*.

On the first of these I had, some time since, prepared some observations for the Press (being under the impression that my conclusions and proposed remedies were *original*), when I found that the phenomena to which I have referred had been already recognized, and that the necessity for providing safe vents for the imprisoned sewer-gases had been strongly urged on the London Corporation by so high an authority as Mr. Bazalgette, their able and eminent engineer. The disappointment which may be conceived to arise from ascertaining that a supposed invention or discovery has been anticipated, was here more than compensated for by finding that views which were perfectly original, as regarded myself, were endorsed by the recommendations of so eminent and practical an engineer as Mr. Bazalgette.

It appears from his report* that he urged on the London Corporation the necessity of attaching vertical pipes to lofty buildings, and connecting these with the crown of the adjacent street sewer. In some instances he succeeded in prevailing on private parties to allow the *rain spouts* to be placed in connection with the street sewer, care being taken always that the superior aperture was kept as much as possible above the level of the upper windows of the houses. But prejudice, or the fear of permitting this connection to be made, was so great, that in few instances only could he effect it; and there would seem to be little prospect of having this precaution carried out on a sufficiently extensive scale unless taken into hands, as a public measure, by the authorities.

With reference to the relieving of the main sewers, two plans had suggested themselves to my mind as feasible:—

First.—Ornamental columns, such as we now see erected to commemorate human slaughter, with its concomitants of untold misery and bereavement, might be constructed, at the public expense, for the far different purpose of abating human mortality and contributing to health and comfort. Such columns, placed in suitable positions, might be, at once, useful and ornamental; and while they could be made to serve as ventilating shafts for the main sewers, might be utilized at the same time for purposes of public lighting, the telegraph, and other uses.

Secondly.—The lightning conductors of existing columns and church spires, which are at present formed of solid material, might be converted into hollow tubes of conducting metal, which would continue to serve the purpose of lightning conductors still, but which, by being brought into connexion with the neighbouring main sewer, might be made to answer the further purpose of carrying the poisonous gases of our sewers into atmospheric strata, far above the dwellings of man, there to be so diluted and dissipated as to be no longer a source of danger or disease.†

* The Report already alluded to, and which can be had through any bookseller.

† It has been objected that there might be a difficulty in getting the gases to ascend through these pipes. This objection is, I think, futile. Every house mason is well aware of the necessity for keeping the aperture of any pipe, which communicates with a sewer, above the level of the upper windows, as otherwise the sewer gases would be conducted into the house. *This is a familiar fact.* But even were it not so, it would not be difficult to exhaust the vent-pipes and the sewers themselves by a self-acting apparatus. It is scarcely necessary to suggest the application of a revolving fan, or spiral flange, to the upper end of the vent-pipe, which should be adapted for its reception. The mere action of the wind on either of these would pump up the gases from the sewers. Nor is this all. The storm, which now, by pressing on the sewer mouth, forces back the gases into our dwellings, would then, by its simultaneous action on the fan, effect a thorough ventilation of the sewer. The efforts of nature to purify our atmosphere would be supplemented, instead of being, as now,

These are measures to be carried out only by municipal bodies, unless indeed enlightened Imperial wisdom should yet see the necessity for direct and stringent interference. As it is, our authorities, imperial and municipal, are so blind or so apathetic in all matters relating to sanitary precaution or improvement, that there seems little chance of any such measures, as those suggested, being carried out during the days of the present generation, even though advocated by the highest authority, and though substantiated by the most unanswerable experiments and proofs.

As to the *private precautions*, here there seems more room for hope; and I shall proceed to describe a domestic precaution which, I am persuaded, is of considerable importance, and which is not the less valuable because it is within the reach of every private individual, is inexpensive, easy of application, and would prove, to a great extent at least, effectual in purifying the atmosphere of private dwellings.

I must now recal attention to the fact that where the area and scullery sewers are trapped, the sewer gases must necessarily find their way (subject to more or less pressure from below) up to the soil-pipe of the water-closet, where, so soon as it reaches the summit, it meets the water in the trap, which is intended to arrest its further progress. Partly, however, from the absorbent power of the water, which slowly imbibes the mephitic gases and delivers them from the surface adjacent to the pan, and partly from the imperfections which time and canker will produce in the best of plumbers' work, these gases are slowly evolved, first beneath the seat of the water-closet, where it is natural to suppose they are not detained very long, but from whence escaping (owing to their diffusibility and volatile disposition) they mix readily with the atmosphere of the closet itself, and thence find access to the body of the house.

The remedy which appears calculated to obviate this effectually is, to insert a small pipe into the summit of the soil-pipe, at its junction with the trap of the water-closet, and to conduct this pipe above the roof of the house, where, by attaching it to a chimney or gable, it might easily be reared to a height sufficient to insure immunity from the effects of the disengaged gases.

A piece of ordinary gas-pipe, an inch or three-quarters of an inch in diameter, would be amply sufficient for the purpose, and by its constant discharge of the volatile and ascending gases, would rid our house sewers of what now constitutes a source of danger; and by relieving the pressure at present caused by continually increasing volume, would obviate the leakage which takes place into our dwellings, and, still further, would greatly help to relieve the tension of the main sewers also.

The summit of the soil-pipe is proposed as the point of junction for the vent-pipe, because where there is a water-closet, it is usually the highest point of the sewerage; but where there is not an elevated water-closet the highest point of the sewerage should be selected for the insertion of the vent-pipe.

It would seem probable that a more general adoption of the patent earth-closets (which appear to have many advantages, and have been favourably reported on by those who have tested them) will supersede to a considerable extent the present water-closet. But it should be remembered that the water-closet is not the sole means by which foul gases find their way into our homes. Leakage takes place from the best-constructed sewers, which is increased by the internal pressure caused by accumulation, where the sewer is trapped; so that, whether it be trapped or not, the pernicious gases are likely to find their way into the house, unless carried into the higher regions of the air.

frustrated; since it is a fact that the storm, intended to purify the adulterated atmosphere, is made, by our imperfect arrangements, to intensify the noxious emanations which it drives now into our dwellings; while the proposed measure presents a means of co-operation with the beneficent design obviously intended by Providence for our benefit, but stupidly perverted by ourselves.

The safest plan, then, would seem to be to trap the sewers effectually, by all means, but on no account to neglect providing a safe means of escape for the sewer gases, which can be done by inserting a vent-pipe into the highest point of the sewerage, whether that be the soil-pipe of a water-closet or not,—only taking care to conduct the vent-pipe to such a height as shall secure immunity from the deleterious nature of its contents.

I fear now that many who expected some profound discovery in physics, or some addition to the inexhaustible resources of chemistry, will have been disappointed. It may be said, perhaps with truth, that the subject was suited, not for a learned society of physicians, but for a company of domestic engineers or a sanitary commission. As I do not happen to belong to either of these bodies I could have no opportunity of laying my views before them, and I do not know any body more capable of judging of the merits of this question than the College of Physicians, to which I have the honour to belong. Besides, if the suggestions I have offered have any real merit, or are calculated to lead to any beneficial result, none can show a claim to their first fruits prior to that of a noble profession, the members of which devote their time and best energies to the alleviation of human suffering, and have never hesitated to risk their lives at the shrine of duty when the interest of afflicted humanity, or those of philanthropic science, required the sacrifice.

PRIZES FOR TYPE-SETTING MACHINES.

THE New York *World* proposes that all the leading publishers in America, whether publishers of books or newspapers, should subscribe towards raising a sum of money, not less than 500,000 dols., for the purpose of offering prizes for an improved type-setting machine. The *World* says that each of the leading newspapers of New York pays for composition alone, sums varying from 100,000 dols. to 200,000 dols. a year, and that all other publishers pay in like proportion. This enormous cost, says the *World*, prevents the publishers of papers from giving their readers the literal "volumes" of matter they would gladly do from day to day, were they not hampered by the delays and cost of composition, and it therefore invites the press of the country to assist in setting inventors to work on the subject. The *World* thinks that 250,000 dols. should be given to the man who produces the "called-for instrument," and that the other moiety of the money should be divided between those men producing the second, third, fourth, and fifth best instruments.

ST. MALACHY'S SEMINARY, BELFAST.

In drawing attention to the illustration of above building given in our last issue, the *Ulster Examiner*, a local paper, has the following:—

"To the old students of St. Malachy's Seminary, who are now fighting the battle of life in the busy world, the current number of the *IRISH BUILDER* will be very interesting, as it has a beautiful full-page 'bird's eye' view of

'The play-place of their early days.'

No doubt some on looking at it will note

'The very tree on which they tried their graving skill,'

as the fine old avenue, a ramble through which would delight a Goldsmith or an Addison, still remains unchanged. But many will miss the old familiar walls of Vicinage, associated as they have been with some of their happiest hours, and will see in their stead others of magnificent proportions, ranking St. Malachy's Seminary among the finest buildings in Belfast. The old green fields, too, with their ancient boundaries, are as they were some 'twenty golden years ago,' so that the silent corner where once an intrate problem in 'Euclid' was mastered, a line in 'Horace' scanned, or one of the sublime speeches of a Burke, or the still grander orations of a Bossuet, pored over, may yet be pointed out. The *IRISH BUILDER*, besides the very accurate representation of the seminary and the extensive grounds attached to it, contains much matter which will be interesting to every class of reader."

EXCAVATIONS IN ROME.

DURING a brief visit to the Eternal City, I have made some notes of the excavations which have taken place this season; and as they may possess considerable interest for the readers of the *Athenæum*, I send them to you without any further preface. By all the rules of patriotism, I give the precedence to the British Archaeological Society of Rome, which, thanks to the unremitting exertions of Mr. Parker, may now be said to have secured a firm footing. As Rome is "the central point for archaeologists of all nations," the natives of any country may become members of the Society by an annual subscription, though the active management of it rests with those of British origin, as being principally supported by them. Independent of the subscriptions, however, it should be borne in mind that there is an Excavation Fund, to which contributions may be made by those who are not members of the Society. Mr. Gladstone is a subscriber to this fund, as is also Baron Quarl, a member of the Prussian Government, and M. de Caumont, a distinguished French archaeologist, as also the Société Française d'Archéologie. From a fund, too, left at his disposal by the late Robert Stephenson, the sum of £100 is given by Mr. Parker annually. These details, which are gathered from the report of 1868, are sufficient to show in what high estimation the Society is held, and a glance at what has been done by it will prove that it merits this consideration. During the year terminating with December, 1868, the site of the Porta Capena (more properly Cannana) was fixed beyond all cavil, the Lupercal of Angustus, the Mamertine Prison, and the point where the principal aqueducts entered Rome. This year, a small number of experienced and clever workmen have been steadily engaged on the following points: two more pits have been made on the line of the short agger, or wall, of Servius Tullius, between the Cœlian and the Aventine, thus making six in all. For a short time, one of the pits remained open for inspection, enabling the visitor to see a portion of the tufa wall of Servius Tullius and of the aqueducts by the side of it. Another pit was made later in the year, showing the junction of the aqueducts with the Piscina Publica; and yet another was made in the Circus Maximus, to show the remains of the lower gallery and one of the staircases. The stones and marble of this building, which was destroyed in the Pontificate of Sixtus the Fifth, were employed as building material for the ugly façade of St. Peter's. The Society conducted another excavation at "Porta Leone," to clear away the sand accumulated in front of the Pulchrum Littus of the Kings—a tufa wall extending from the Publician Bridge to the Pons Palatinus, or Ponte Rotto. Other labours might be mentioned; but these are sufficient to show that the British Archaeological Society of Rome is a working society deserving support. Lectures have been delivered or composed by Mr. Parker, Cavaliere Visconti, Signor Lanciani, Signori Fabio and Gori, and by the indefatigable secretary, Mr. Shakspeare Wood. At intervals too, when the weather permitted, excursions or walks, more or less distant, have been made to illustrate, by local investigation, questions of archaeological interest. Thus within the last fortnight there have been two "walks" round the Palatine; one round that portion which is being excavated by the Emperor of the French; the other to that which is being cleared by the Pontifical Government. His Holiness takes considerable interest in the works of excavation, and some of the more recent may be noted with advantage. The number of fine and coloured marbles at present disinterred amounts to 1,110, which are all carried off to the Vatican to supply the enormous demand which is constantly made by that vast pile of buildings. The Emporium lies on the banks of the Tiber, and various circumstances show that each sort of merchandise had its separate place of disembarkation.

Further investigations have shown that

what was supposed to have been the Barrack of the Vigili, or Night Guards, was in fact only the guard-house of one division,—it was the Execubitorium, not the Statio. Under the same auspices excavations were made in 1868 in the great area, surrounded by a Porticus, in front of the palace which was built by Domitian; and in January of this year several new blocks of marble were found in the Marmorata, and a very fine column, buried in a singular manner and built over during the Middle Ages. The Thermæ of Caracalla have also occupied the attention of the Government this year. Great masses of the roof had fallen in, and on removing the débris important discoveries have been made. The artist, however, equally with the archaeologist, has been gratified by the discovery of two fine statues at Ostia,—one of marble, which for the present is left where it was found, the other a small, beautiful figure of Venus in bronze. It is about two feet two inches high; the feet are crossed, one resting on the toe, giving an air of elegance and elasticity to the figure. One arm is raised, with a distaff in her hand; the goddess being represented in her character as one of the Paræ, a character which was given to her at times, and this is the only known statue in which she is so represented. On its being brought to Rome it was sent to Castellani to be made "decent" by such a covering as defaces the geni on the monument of Cardinal York, and such as is to be found on many other statues of this very sensitive but prurient country. A Russian gentleman has offered 70,000 *lire* for it, and been refused; but no one knows where the Venus now is. It must not be omitted that at the beginning of the year the municipality of Rome voted a large sum to carry on the excavations in the Mamertine Prison, which were begun by the British archaeologists last year. The excavations on the Palatine have been continued by the Emperor of the French with his usual liberality, under the direction of Signor de Rosa; and four Roman Princes, Borghese, Aldobrandini, Salviati and Launcelotti, have engaged in similar honourable enterprises near the Agger of Servius Tullius, close to the railway station. Prince Aldobrandini is engaged also on excavations at Traseulæ, but from what I hear, in the too common spirit, a desire to find materials for building and objects of Art for a gallery. Whether by permission of order, stones have been carried off from the Amphitheatre for building, and the Podium, which was perfect, now scarcely exists. In the Coliseum the seats of the Podium are not to be found; those therefore of Traseulæ were above all value to the archaeologist, chips of stone, showing signs of the mason's work, are now lying about. Lastly, the Marquis Patrizi is excavating in the garden of his villa outside Porta Pia, where he has found what appear to be the remains of a villa of the time of the Empire.

I have thus given you a rapid but necessarily imperfect sketch of archaeological labours in Rome during this season; had I entered into details, this letter would have assumed too large proportions. I cannot close my remarks without expressing my regret that more is not done to preserve much that is glorious in Art or Antiquity. Many monuments of the past are crumbling into ruins; and if researches are made from a desire of acquisition only, or principally, without a sacred respect for the past, the Eternal City will gradually lose its right to the title.

H. W., in *Athenæum*.

THE MINERAL RESOURCES OF IRELAND.

A CORRESPONDENT of the *Belfast News-letter* writes as follows:—

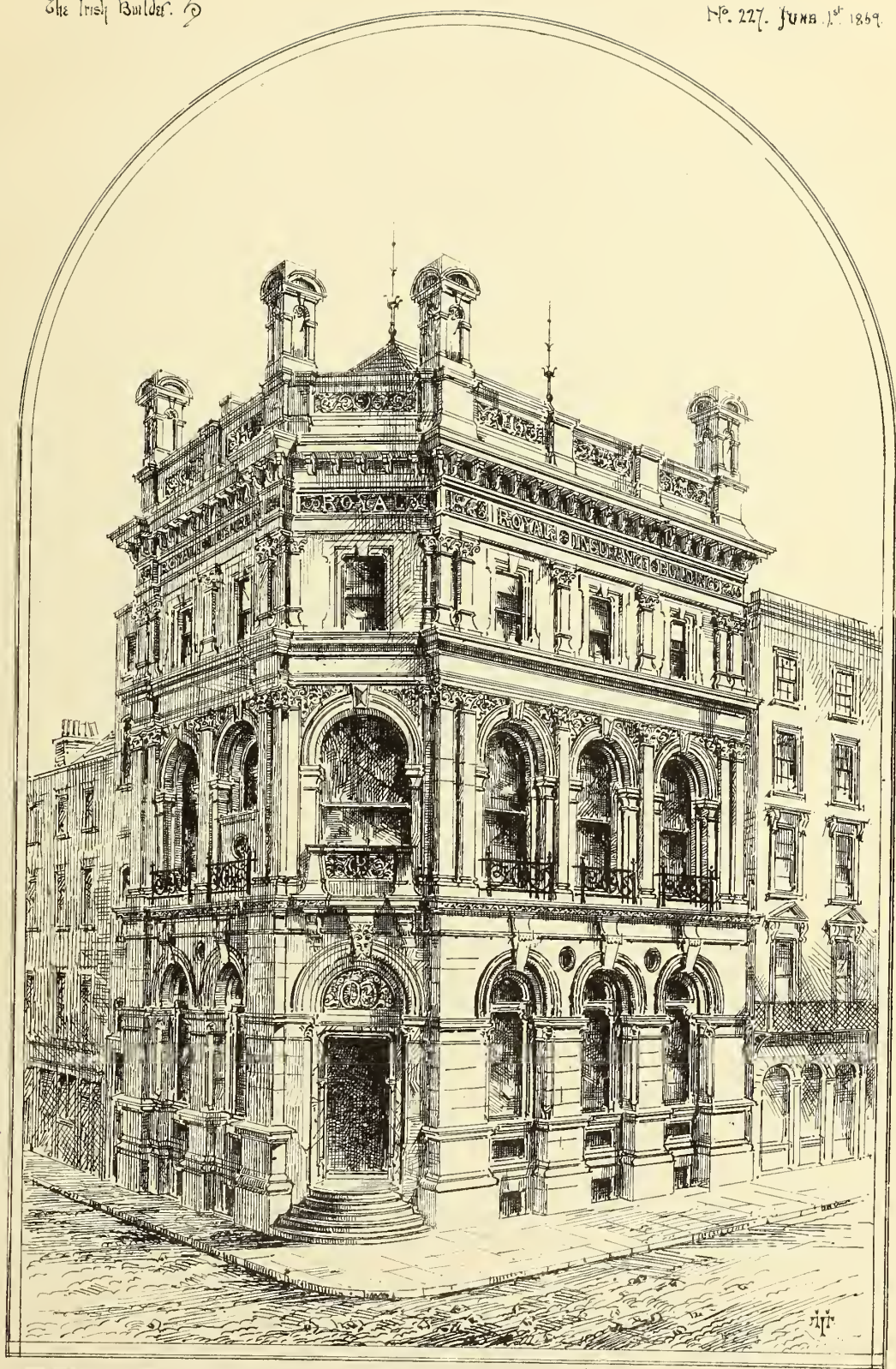
My motive in writing to you is to draw attention to only one at present of the neglected mineral resources of Ireland; but may, with your permission, enlarge upon this important subject on some other occasion.

Considering that Belfast has been called the Liverpool of Ireland—the central point of four important railways—and that the leading principle which now actuates a great number of her enterprising inhabitants, it is a matter of surprise that, with, perhaps, some exceptions, none of them have turned their attention to the undeveloped mineral resources of this country.

It is said that "money is the root of all evil," but, for all this, gold never loses its powerful attractive influence; and, if it had not been for its attraction, Australia and California would not have been so numerously peopled from this country, whose spirit of independence prompted them to leave their native land; but, in the enjoyment of the pleasures of hope of returning at some future day, and, no doubt, with the deep resolve, "let my right hand forget her cunning, if I forget thee, my own beautiful green isle," which will ever be considered by them as—

"The first flower of the earth,
And first gem of the sea."

Before I say any more relative to this country, I wish to remark that I have observed with pleasure that the gold diggings are on the increase in Kildonan. It would appear that gold was collected at a very early period in Scotland, and particularly in the mining field of Leadhills. The most extensive operations for that purpose were carried on by a Mr. Balmer, an Englishman, in the time of Queen Elizabeth. The trenches and other marks of these operations are, perhaps, visible at Leadhills, and Elvanfoot, and likely still retain the name of Balmer's Workings. At that time it is said that 300 men were employed in searching for gold, and, in the course of a few summers, a quantity was collected equal in value to £100,000 sterling. Similar operations were resumed at a later period, by the advice of a German. Gold was found, but I am not aware whether the quantity obtained was equal to the expense. In the year 1796 a piece of gold, about half an ounce weight, was found by a man in the bed of a small river on the mountains of Wicklow, in Ireland. This excited the attention of the country-people, who began to search for gold, and continued their operations for nearly two months, when they were interrupted by an order from Government. It is said that the sum of £10,000 Irish was paid for the gold found and sold on the spot. The average price at which it was sold was £3 15s. per ounce, making the total amount of the gold collected at that time equal to 2,636 ounces. The ore was so pure that its specific gravity was 19, and 24 grains yielded, when assayed, above 22½ grains of gold. The greater part of the gold was entirely free from stony matter; but some of it was attached to quartz, or a fine-grained iron-stone, and sometimes disseminated in these minerals. In the course of the operations several masses of native gold, exceeding an ounce in weight, were found in the soil. One mass was discovered which weighed 5 ounces, and another amounting to no less than 22 ounces, which, it is said, was the largest specimen of native gold ever discovered in Europe. The space where the gold was collected is of a very limited extent, not exceeding 350 yards along the banks of the brook in which the first piece of gold was found. The brook is only about six or seven feet wide, and, before the operations commenced, had formed its channel down to the surface of the rock. The banks of this small stream are composed of a stratum of sand and gravel about five feet thick, which reposes on a rock of argillaceous schist, which is intersected by veins of quartz. As the alluvial soil in the stream to which I have alluded, and, perhaps, many others on the mountain sides in Wicklow, furnishes gold, probably this letter may be read by some enterprising miners, or others in that quarter, and may induce them to make proper searches for gold, by which they may become the fortunate discoverers of extensive depositions of this precious metal; and, if successful, these few suggestions of mine will then be properly appreciated.



ROYAL INSURANCE BUILDINGS, DAME ST. DUBLIN.

W^m G. Murray. Arch^t.

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MONAGHAN AND CAVAN NEW LUNATIC ASYLUM.

THE new Lunatic Asylum for the Counties of Monaghan and Cavan, erected at Monaghan, was opened by order of the Lord Lieutenant in Council, on Monday, the 17th ult., under the management of Dr. Robertson, the resident medical superintendent.

This building, which has been in course of erection for the last four years, contains accommodation for over 300 patients, and comprises a main central building containing day-rooms, dining-rooms, dormitories, reading-rooms, school-rooms, single rooms, and all the other requisites of an institution of the kind. At the rear of the central main block is the recreation and dining hall, 66 ft. by 41 ft., with gallery for orchestra, &c.; behind this are the kitchens and culinary offices.

At the ends of the main central building are the detached infirmaries, approached by covered ways, and to the rear of the main building, at each end, are the retired wings for the noisy and more unmanageable patients of either sex.

There are also detached blocks on the system now so much advocated by the highest authorities on insanity, and which have been so successful at Quatre Mare, Rouen, Prestwick, Chester, and other asylums, by which the different phases of this disease can be more effectually dealt with than by the congregating of all classes of patients in one block. This mode of treatment is, we believe, gaining ground on the Continent and in England to a great extent.

To these detached blocks or buildings the patients who may show symptoms of improvement can be removed, there to meet with those less afflicted than they have been accustomed to mingle with, and thence, when further improvement takes place, to another block, where less insanity may be found than in that which they left. There is, naturally, a great diversity of opinion as to the different modes of treatment of insanity, but this system has found great favour with some of the highest authorities on the subject.

There are extensive farm-offices, workshops, recreation grounds, a chapel, board-room, and all the requisite offices and apartments for the various officers that must be required for so large an establishment, which, we trust, from the experience of the able and efficient resident superintendent, Dr. Robertson, will be a success.

Some idea of the extent of the buildings may be obtained from the fact, that there are over 1,000 yards of corridors communicating with them. It is the largest asylum yet built in Ireland.

The asylum has been erected from the plans submitted in competition by Mr. John McCurdy, architect. Messrs. Wardrop and Sons were the general contractors for the works, under the Board of Control of Lunatic Asylums, Ireland. Messrs. Ross and Murray executed the engineering, laundry, and plumbing works, and Mr. Daniel the gas-fittings.

We may add that this asylum has been singularly successful in obtaining an abundant supply of water from a well sunk by Messrs. Wardrop, from which the steam-engine can raise over 3,000 gallons per hour. The grounds are over 40 acres in extent.

The same contractors have also in hands the new asylum at Richmond, and also the additions at Omagh Asylum.

ANGLO-FRENCH RAILWAY BRIDGE.

THERE is an old proverb that teaches something about doing more with a silken thread than with a rod of iron: and, recognising its truthfulness, Mr. James Moncrieff, of Belfast, has (says the *Mining Journal*) designed a new bridge for connecting the English and French coasts, which for lightness and simplicity is certainly unsurpassed. He proposes to erect at each side of the Channel an abutment of masonry, of sufficient strength to resist the strain of hydraulic power necessary to tighten the wire-ropes of which the bridge consists. He would screw iron piles in the

Channel a quarter of a mile apart, these piles being repeated to form the piers of the bridge. The piers are carried 200ft. above the level of the sea, and light-houses are constructed in them to prevent their being an impediment to the navigation of the Channel. He proposes to use about fifteen steel wire-ropes, of sufficient thickness to bear the required weight, and those he would place 1ft. apart, stretching them from one terminus to the other, and permitting them to rest upon the top of the piers. The ropes, having been placed in position, are to be drawn perfectly tight by means of the machinery on the abutments already alluded to. As a superstructure, he proposes sheeting and framing a timber platform to carry the rails, &c., and to secure it on the upper surface of the ropes. The engine and carriages are to specially constructed for running on the bridge, and a side-railing, or other suitable fence, is to be provided. Mr. Moncrieff states that his estimate, so far as he has been able to calculate, is £3,000,000. He states that he has made a model of the bridge, and that, so far as it can be depended on, it is very satisfactory. Before proceeding further with the project, Mr. Moncrieff is desirous of ascertaining the opinion of practical men as to the feasibility of the proposition. There can be no doubt that both the machinery itself and the abutment to support it must be of considerable strength to admit of the slack being pulled out of twenty miles of steel wire-rope—a yard in circumference (for, judging from the drawings forwarded, that appears to be the character of rope which it is proposed to use)—even assuming special arrangements to be made for preventing friction at the top of the piers during its passage over them. It will probably be found, moreover, that the estimate is rather too low, considering the present price of steel, and the form in which it is employed. It would be interesting for Mr. Moncrieff to state the weight of each 20-mile rope, and the nature of the abutments and machinery which he purposes to use, as this will greatly facilitate the reply to the question he has raised as to whether the idea can be carried out in practice.

CORRESPONDENCE.

MEDDLING BUILDERS.

TO THE EDITOR OF THE IRISH BUILDER.

SIR,—What will your architect and respectable builder readers say when I tell them that I am the architect of certain works in this city, with a local builder as contractor, who, during the progress of said works—and I in daily attendance superintending—submitted to my client his own designs, with an amended estimate for bar fittings (drawings for which had been previously prepared by me according to instructions), and therefore formed a separate contract? From me the act demands no comment more than its publicity.

J. J. LYONS.

25, Westmoreland-street.

[The architect can, of course, demand his fees on the value of the work which was first contemplated, and for which he made out plans according to instructions. Recent legal decisions are entirely in his favour.—Ed. I. B.]

RAILWAY NEWS.

THE Wexford Harbour Commissioners have consented to the laying down of a line of rails along the quays. At their meeting on Tuesday Mr. Martin Farrell, C.E., explained the objects sought to be accomplished:—1st. To construct a harbour at Ballygeary, and from thence to run a line of steamers to Fishguard in Wales, the distance being only 55 miles; 2nd. To connect Ballygeary with Waterford on the one hand, and with the Dublin, Wicklow, and Wexford Railway on the other. The original idea was to make the connecting line between Ballygeary and the Dublin, Wicklow, and Wexford Railway at the back of the town of Wexford, but on account of the lower level and other consi-

derations, powers would now be sought to deviate from the authorised line, and to run the line along the quays. The quays being narrow, the tramway could be made along their edge; and in order to compensate for the space which would thus be occupied, a piled wharf would be made outside the quays, so as to provide for the mooring, loading, and discharging of vessels. This wharf might be railed in and furnished with gates. Surveys will be immediately laid before the Board of Trade, with a view to obtaining the consent of that department.

NOTES OF WORKS.

The church of SS. Philip and James, Holywood, Co. Down, was consecrated on the 19th ult. by the Lord Bishop of Down and Connor. The additions which have just been completed to the old church may be said to constitute it almost a new building—they comprise a nave, chancel, and south aisle. Accommodation is now provided for about 720 persons. The church, which is an elegant and graceful structure, is in the Early English style, and is built of Serabo stone. The dimensions are:—Nave, 78 by 30; chancel, 33½ by 25½; total width, 72 ft.; height from floor to ridge, 58 ft. The arches flanking nave on either side are of red stone, and stand at proper and convenient intervals. From them spring the arches supporting north and south walls, which are pierced by a row of windows on each side, overlooking the roofs of aisles. On one side of chancel stands the reading-desk, while the pulpit occupies a corresponding position on the other side. Two porches have been constructed, one on each side of west gable, and at this end the old tower remains, the top of final standing 71 ft. above its base. At the north-east side of the church is the vestry-room, underneath which is the heating chamber. The organ, after renovation by Mr. J. C. Combe, of Belfast, has been re-erected in a recess close to the chancel. The chancel corona lights were the gift of Capt. Hincks, and the lectern of Capt. H. C. Treacher. The gasfittings were supplied by Mr. Hall, Queen-street. Messrs. Lanyon, Lynn and Lanyon were the architects; Messrs. Lowry and Son, Great George's-street, Belfast, were the contractors. The cost was about £5,000.

A new avenue has been opened at Dolphin's Barn, and twenty houses completed for our fellow-citizen, Mr. Jas. Reilly, Upper Abbey-street. They have been erected from the plans and under the superintendence of Mr. George Parrott, C.E., 72, Dame-street. To this already rising neighbourhood they are a great additional improvement. They are well laid out and commodious, and in every respect suited for tenants who cannot afford to pay the rents generally required for houses intended for the middle classes. Each house is fitted with a Shanks' patent combination water-closet, and a regulating cistern for the supply of the Vartly water. A perfect system of drainage has been carried out. The work is well executed, and reflects credit on all parties connected with it.

The new Lecture-hall at Nenagh was formally opened on Tuesday last. It has been constructed to seat about 400 persons. The site was given by A. Parker, Esq., of Castlelough.

A new Presbyterian church is to be erected at Carlingford, Co. Louth, on a plot of ground in the Main-street freely granted by Lord Clermont, the worthy proprietor of the soil.

The new bridge over the Ovoca River, Co. Wicklow, will shortly be opened for traffic. It will be remembered that the old bridge was carried away by the floods in the early part of last year. The new bridge (from the designs of Mr. Henry Brett, C.E.) consists of three semi-elliptical arches, of 45 feet each, resting on piers and abutments of suitable proportions. The length is 170 feet. The material used is hammered granite from the Aughrim quarries. The contractor was Mr. M. Clarke, of Wicklow. Cost about £3,000.

THE PACIFIC RAILWAY THE TENTH WONDER OF THE WORLD.

ONE of the greatest engineering feats of modern times was completed this day week; and strange to say, the announcement of its completion was the first intimation which thousands in this country received of its ever having been set on foot. A telegram informed us (*Birmingham Post*) that on Saturday the last rail was formally laid of the great line which stretches across nearly three thousand miles of the American continent, and unites the Atlantic and Pacific Oceans; and we learned by a subsequent cable message that in New York the exuberant feelings of triumph excited by the event took the unusual form of a solemn *Te Deum*, celebrated in one of the largest churches in the city. The gigantic character and immense importance of the undertaking seem to have been realised all at once, and this perhaps explains how the world has hitherto heard so little about it.

The cession of California to the United States in 1848 suggested the necessity of establishing railway communication between the Eastern States and the farthest limits of the West; and although the task was a prodigious one, it was not pronounced to be impossible, and the resolution was, therefore, taken that it must be done. The eastern border of Nebraska was the terminus of all the railway routes north of the thirty-fifth degree of latitude; and beyond that point more than seventeen hundred miles had to be travelled over immense deserts and huge mountain barriers before the shores of the Pacific were reached. Then, other difficulties besides those of a physical character had to be surmounted. Missouri engaged in a fierce contest with Iowa and others of her neighbours for the advantages which were foreseen to accrue to those parts of the country through which the great Pacific highway would pass: and millions of dollars, it is alleged, were spent in endeavouring to help wavering members of Congress to come to a decision on the point. Unfortunately for the South, the question was settled during the height of the civil war, and of course favourably to the claims of the loyal Northerners. It was finally arranged that the new line should start from Omaha City, near the junction of the Platte with the Missouri, and that the bed of the former river should be adapted as the route as far as the Rocky Mountains.

The work was entrusted to two companies, one of which, late in 1865, commenced operations at Omaha, and the other at Sacramento, 1,721 miles distant. Liberal terms were granted by the Government with respect both to money and land. The companies were handsomely subsidised, and an absolute grant was made of 12,800 acres of land for every mile of road, with a perpetual right to all that it produced in the shape of timber, iron, and coal. This concession, however, does not represent such a large amount of wealth as might at first be supposed. Some parts of the road are well wooded, and contain coal beds which will repay working; but between Omaha and the sources of the Platte not a single tree is to be seen for five hundred miles, and of this distance there are three hundred miles of arid waste from which no possible benefit can be derived. The first formidable barrier was presented by the Black Hills, which had to be crossed at an elevation of 8,262 feet; but the summit was reached by a comparatively easy gradient, exceeding in no case ninety feet per mile. After leaving the Rocky Mountains other lofty ranges had to be traversed, sometimes at an elevation of nearly eight thousand feet; but only for about three miles was it found necessary to resort to the maximum gradient allowed by Congress of 116 feet per mile. There are only a few tunnels, and the longest is not more than 1,700 feet. "This bold undertaking," says Mr. W. A. Bell, to whom we are indebted for most of our facts, "has been carried out with an amount of energy beyond all praise. The road has been built, not by a staff formed of scientific engineers—

but by a few go-a-head merchants of San Francisco, who left their counting-houses to become railway contractors. All last summer 10,000 Chinamen and about 3,000 teams were employed to grade and lay the track across the basin region, when the snows had sufficiently thawed to enable them to complete the tunnels. An average of 500 tons of ties, rails, spikes, bolts, and chairs were carried over the Sierra Nevada, in fifty cars, drawn by ten locomotives every day, and were sent from three to four hundred miles to the scene of operations. Here two miles, and sometimes more, were being laid per day, and each two miles required five hundred tons of materials for their construction." Still more graphic is the description furnished by a Yankee who visited the scene of operations for the purpose of reporting progress to his countrymen "down east." "Track-laying on the Union Pacific," he remarks, "is a science, and we, pundits of the far East, stood upon that embankment, only about a thousand miles this side of sunset, and backed westward before that hurrying corps of operatives, with a mingled feeling of amusement, curiosity, and profound respect. On they came. A light car, drawn by a single horse, gallops up to the front with its load of rails. Two men seize the end of a rail, and start forward, the rest of the gang taking hold by twos, until it is clear of the car. They come forward at a run. At the word of command the rail is dropped into its place, right side up, with care, while the same process goes on at the other side of the car. Less than thirty seconds to a rail for each gang, and so four rails go down to the minute. Close behind the first gang come the gangers, spikers, and bolters, and a lively time they make of it. It is a grand anvil chorus that those sturdy sledges are playing across the plains. It is triple time, three strokes to a spike, there are ten spikes to a rail, four hundred rails to a mile, eighteen hundred miles to San Francisco. That's the sum; what is the quotient? Twenty-one million times are those sledges to be swung—twenty-one million times are they to come down with their sharp punctuation before the great work of modern America is complete."

Now that the great work is complete, there are found even among enthusiastic Americans, croakers who mar the general jubilation which prevails, by expressing grave doubts as to whether for half the year the line will be of the slightest practical service. If the snows are not eternal in the passes of the Rocky Mountains along which the railroad winds its way, it is attempted to be shown that the known depths to which the snow falls and packs in these regions in the winter months, presents, to say the least, an "undetermined problem" as to the perfect success of the enterprise. This contingency has been so far provided against that not less than twenty miles of the line have been covered with wooden sheds, and the energy and skill that have already triumphed over so many obstacles will doubtless be prepared to cope successfully with this other difficulty, should it present itself, even in the very worst form in which the croaking prophets declare it may be expected. Those who prophesy evil things are, however, in the meanwhile wholly at a discount. The American public, as becomes them, believe in the scheme as altogether perfect and discern through it dazzling visions of commercial and territorial aggrandisement. Henceforth New York, they believe, will become the centre of the world's commerce. China, Japan, and the rich Islands of the South Pacific are brought by the American overland route thousands of miles nearer to Europe than they were before; and the conclusion is naturally arrived at that both merchandise and passenger traffic to those parts of the world will pass at once into the newly-opened and shorter channel. Furthermore, says the Senate Committee on railroads, "the opening by us first of a North Pacific Railroad seals the destiny of the British possessions west of the 91st meridian. They

will become so Americanised in interests and feeling that they will be in effect severed from the new dominion, and the question of their annexation will be but a question of time." Another expected result is a second exodus of the Saints, whose retreat at the Salt Lake had been rudely disturbed; and thus we are forced shrewdly to suspect that homage to pluck, capital, and skill was not the only element which entered into the enthusiasm of the calculating New Yorkers as they chanted their solemn *Te Deum* at Trinity Church on Monday. Meanwhile we feel ourselves immensely superior to mean commercial or territorial jealousies, and heartily congratulate our go-ahead consins on the great enterprise which they have so quietly, rapidly, and successfully achieved.

RIVET THE LAST PACIFIC RAIL.

Rivet the last Pacific rail,
With a silver hammer and golden nail;
For over the hill and over the vale
The iron horse is swiftly coming.
Along the prairies, wild flowers sweet
With red lips kiss his flying feet,
Wild eagles his wild scream repeat,
His hymn of praise the bee is humming.
Hail to the day and deed!
Hail to the iron steed!
Hail to the iron rail!
Hail to the West, all hail!

Now the rising and setting sun
Shall see the East and West are one,
Wherever the steed of steam shall run,
The Union shall be one for ever.
State linked with state with iron bands,
Hearts linked with hearts, and hands with hands,
Hail to our broad free lakes and lands!
Hail to our free lands!
Hail to our free hands!
Hail to the golden rail!
Hail to the last rail!

Over prairies of gold and green,
Over rivers that roll between—
Plumed mountains of richest sheen,
The steam horse toils harder and harder.
Now searing the wild herds and flocks,
Now thundering over granite blocks,
Now climbing the steep shelving rocks,
Now up the Sierra Nevada,
Hail to the plains below!
Hail to the peaks of snow!
Hail to the hammer's stroke!
Hail to the echoes woke!

From ocean to ocean the rail
Runs over the mountain and vale,
Which echo with blows on the nail,
Now heard by the listening races.
Hail to the pathway of nations here,
It runs today through a hemisphere,
The good time coming must now be near,
It shines on our hope-lighted faces.
Hail to the age of steam!
Hail to the iron team!
Hail to our iron bars!
Hail to our flag of stars!

G. W. BUNGAY.

SEALS AND MEDALS FOR CANADA.

THE Messrs. Wyon have recently prepared for the Canadian Government a series of seals and medals. The great seal of the Confederation is of solid silver and five inches in diameter. Its centre is occupied by a seated figure of the Queen under a Gothic canopy, and in the corners are four shields bearing the arms of the confederated states. Four other seals, smaller, but equally artistic in design and execution, have been made for the use of the provincial Government. The Canadian Government have likewise had struck off a number of medals to commemorate the establishment of the Confederation. Her Majesty's half-length figure adorns one side of the medal; on the other side, Britannia, with the lion at her feet, hands to the provincial representatives their scroll of confederation. The sickle and corn which one of these graceful recipients bear typify the produce of Ontario; the broad paddle often seen on the St. Lawrence, and the *fluer de lis* ornamentation on the shoulder of another, speak of the pursuits and mingled nationalities of Lower Canada; the digger's spade of a third points to the mineral wealth of Nova Scotia; and the lumber axe of the remaining one represents the timber trade for which New Brunswick is famous. A copy of the medal in gold, valued at sixty guineas, is to be presented to Her Majesty.—*Broad Arrow*.

L A W .

COURT OF COMMON PLEAS—May 14, 15.

(Before Chief Justice Monahan and a Special Jury.)

Fogerty v. Walsh.—This was an action by Mr. W. Fogerty, architect, of Harcourt-street, against Mr. John Walsh, of Dundrum Castle, to recover the sum of £65 9s. for preparing drawings, specifications, and details, and obtaining tenders for certain works proposed there. Defendant pleaded that the plans, &c., were not to exceed a contemplated outlay of £800, but that they did exceed that limit; also, that the plaintiff was to have superintended the work, but became ill and unable to do so, whereby the plans became useless. He also paid £6 16s. into court. Messrs. Purcell, Q.C., Falkiner, Q.C., and Boyd, LL.D., instructed by Mr. F. G. Tindler, solicitor, appeared for the plaintiff; Messrs. Heron, Q.C., Murphy, Q.C., and Walker, instructed by Mr. Hayes, for the defendant.

Mr. Purcell stated the plaintiff's case. His client was a well-known architect in extensive practice, and in the beginning of the year 1867, had been applied to by defendant to furnish plans for and report on certain proposed alterations at Dundrum Castle. He had prepared a preliminary plan, which, with an approximate estimate of £900, was submitted to defendant on the 27th April same year. Defendant, so far from objecting to this, invited the plaintiff out a second time, as per letter which would be produced, "to make arrangements for carrying out the work." On this second visit defendant directed the plans to be enlarged considerably, also plate glass, cornices, and other embellishments to be added, which obviously required a large increase on the original estimate. Before proceeding any further, however, the plaintiff furnished a second plan, which was finally approved of by defendant on the 5th August, and directions given to prepare working drawings and get tenders. While these were being prepared defendant called frequently at plaintiff's office, saw his assistant, Mr. Wilson, and was fully cognizant of everything that was being done. A surveyor, Mr. Taylor, was employed to take out the quantities, and the tenders came in during the month of October. Defendant, however, then delayed, and left the tenders lying at the architect's office for more than four months unopened, and it would be proved that but for this delay on his part the work might have been finished at the time originally intended, namely, the spring of 1868, which consideration, he contended, should effectually dispose of the second defence set up by the defendant—namely, that plaintiff got ill and unable to superintend the work, as this did not take place till the middle of May. When at length, on the 26th of February, 1868, plaintiff wrote to defendant asking what he was to do about the tenders; defendant wrote alleging that he had been premature in getting tenders, and complaining for the first time that some of the work was too expensive. Plaintiff, however, met him in a friendly way, informed him that no harm had been done, and suggested that if the tenders ran too high the work could be simplified, and the cost reduced before any contract was made. The tenders were then opened, the lowest being that of Messrs. Hall and Son, builders, for £1,300, the rest varying up to £1,800. As Mr. Walsh considered this amount too high, the plaintiff, in conjunction with the surveyor, prepared a "bill of reductions," showing how the expense might be reduced to £900, the amount of the original estimate, even on the larger plan. Just as this had been arranged the plaintiff was taken ill, and was unable to attend to business for some months; but his brother, Mr. Joseph Fogerty, a member of the same profession, resident in London, came over to take up his business. Amongst other matters this was taken up by him, and at a meeting at which defendant was present, Messrs. Hall undertook to carry out the work for the £900, or with a new roof, for which defendant was anxious, for £1,000. Mr. Joseph Fogerty offered also to superintend the work in con-

junction with Mr. Drew, an able and well-known Dublin architect, who had been appointed to carry on the plaintiff's business during his illness. The greater part of the architect's work was however done, amounting to $3\frac{1}{2}$ per cent. of the usual 5; and it would be proved that any respectable architect would have inspected the work for the balance of the 5, had Mr. Walsh any reason to be dissatisfied with the arrangements proposed. Mr. Walsh, however, announced his intention of abandoning the work on account of plaintiff's illness, and repudiated the surveyor's account, which was just then sent in to him. The plaintiff, however, recovered about the month of October, 1868, and then furnished his own account, charging at the rate of $3\frac{1}{2}$ per cent. besides some minor usual charges, making the amount of the present claim. He also offered a reference to any respectable architect. Defendant refused this and referred him to his solicitor, as "the best way to preserve the friendly relations hitherto subsisting between them," and so the present action had been brought. Shortly before bringing it, however, the plaintiff discovered that the work had been carried out substantially, according to the plaintiff's plans, by the same builders, Messrs. Hall, and, as a copy of the plans remained in the possession of Mr. Walsh, this clearly showed that defendant had received all the benefit of the plaintiff's skill and professional knowledge, for which he had only paid into court the paltry sum of £6 16s., being the sum charged in the account for the first visit and survey of the premises, leaving, in fact, nothing for all the subsequent plans and services.

Mr. W. Fogerty, F.R.I.B.A., was examined by Mr. Falkiner in proof of the statements above given in detail, also the several documents. No limits of cost had been prescribed to him, but he was to name a sum, which he did on the 27th April by letter produced, of £900 for the first plan. This was not considered to give sufficient accommodation, and accordingly he prepared a second. The second plan was about one-third larger in cubic content, and as it was to have plate glass and other embellishments ordered by defendant, not contemplated at first, this quite accounted for the difference. Had, however, reduced the estimate by leaving these out, so that the second plan could be built for the £900, before he got ill. Told Mr. Walsh he should pay the surveyor if he abandoned the work, but on hearing that the work was being carried out by Messrs. Hall, had directed the surveyor, Mr. Taylor, to apply to them instead. [Mr. Taylor, the surveyor, has recovered the full amount against Messrs. Hall, as given in our last issue.] Had been to see the work executed at Dundrum Castle recently; it is in all essential respects the same as his plans, as reduced, with some slight modifications.

Cross-examined by Mr. Heron—Did not consider himself absolutely unlimited because no limits were fixed; considered the plan and estimate of £900 very reasonable, but defendant did not consider it gave accommodation enough; considered the £1,300 too low for the enlarged plan, but the increase of size and finish fully accounted for the difference; it was usual to employ a surveyor whenever tenders were required; it was also usual for the architect who made the plans to superintend the work, but there were plenty of exceptions to this rule; for plans, details, &c., without superintendence, $3\frac{1}{2}$ per cent. was a fair proportion of the 5.

Mr. Thos. Wilson, examined by Dr. Boyd—Is chief assistant to Mr. W. Fogerty; had the plans, &c., for Dundrum Castle in hands; Mr. Walsh called frequently, and saw them during their preparation; told Mr. Walsh all about the getting of tenders; had asked Mr. Walsh was there any limit of expense fixed, but received no answer; was present at the opening of tenders and other interviews between Messrs. Fogerty and Mr. Walsh; heard the offer of Messrs. Hall to build for £900, already alluded to.

Mr. Joseph Fogerty, Memb. Inst. C.E., examined by Mr. Purcell—Is an architect and

civil engineer practising at 1, Westminster Chambers, Victoria-st., London, and brother of the plaintiff; came over to Ireland in May, 1868, to take up his brother's business; saw Mr. Walsh by request, and went out to Dundrum Castle; found that the work had been all fully arranged by his brother—in fact it was "cut and dried"; met Mr. Walsh and Mr. Hall, the builder, at his brother's office in Harcourt-street; Mr. Walsh professed himself willing to spend £900, which he said was the amount of my brother's estimate; he did not tell witness, however, that this estimate was only approximate, and referred to a smaller plan; Hall offered in my presence to do the work even on the larger plan for £900, or with a new roof for £1,000; I offered to inspect the work, and introduced Mr. Drew, who was then conducting several large works for my brother during his illness; defendant seized his hat, and left, and wrote next day announcing that he had abandoned the work on account of my brother's illness; has seen the work executed; it is almost exactly the same as that planned by my brother, for which the estimate of £900 was given by Hall; the two plans exactly coincide.

Cross-examined by Mr. Heron—Had seen the "list of differences" drawn up by defendant to show that he had not adhered to plaintiff's plans; it was a most absurd and misleading document; most of the alleged differences had been arranged by his brother in the "bill of reductions"; the work was the same, but carried out in rather an inferior way; some of it was such as no architect would sanction.

This closed plaintiff's case.

Mr. Heron, in an able speech, stated the case for the defendant. One story was good till another was told. His client had only contemplated very modest works at Dundrum, which, though called a "castle," was really only a small house. He had got sundry plans from builders before, including the Messrs. Hall, and could have carried out this very modest job without any architect at all. In an evil hour, however, he had called in Mr. Fogerty, whose ideas were very magnificent, no doubt, but quite unsuitable for his client. He would prove that at the first interview Mr. Fogerty was clearly instructed that he was not to exceed the sum of £700 or £800. The plans and specifications prepared were very elaborate, and doubtless costly, as they ran the expense up to £1,800 or £2,000; but they were wholly unsuitable. As he was instructed, the work carried out was on a plan of Messrs. Hall, and not on Mr. Fogerty's plans.

Mr. John Walsh examined by Mr. Murphy—Had told Mr. Fogerty at the first interview that he meant to spend only £700, but that if he saw something very enticing he might go to £800. When he got the first plan and approximate estimate from Mr. Fogerty of £900, considered it too high; would not give that sum. Was most anxious to have Mr. Fogerty inspect the work, if possible; but found all his plans too expensive. Never authorised the tenders to be got in. Was getting the work now done on a plan of his own. Had kept Mr. Fogerty's plan, but did not use it.

Cross-examined by Mr. Falkiner—Could not recollect which plan the estimate of £900 referred to; could not recollect what happened at Mr. Fogerty's second visit; his mind was a "perfect blank" as to all that then occurred (laughter). Was very indignant when told by Mr. Fogerty that he should pay the surveyor; but for this, would have offered Mr. Fogerty something for his trouble.

Mr. Frederick Walsh, Q.C., and Dr. Walsh, brothers of the defendant, deposed that at the first interview the sum of £700 or £800 had been stated to Mr. Fogerty; could not, however, recollect anything of what happened at subsequent interviews.

Mr. Taaffe, foreman to Messrs. Hall, was examined to prove differences in the work executed from the plans prepared by plaintiff, which, however, were of trifling character.

Mr. Murphy addressed the jury for defendant, urging that plaintiff had exceeded

the limits prescribed, and that therefore defendant was not liable.

Mr. Falkiner replied on the part of plaintiff, and submitted that even supposing a sum had been originally named by defendant of £700 or £800, plaintiff had fully advised him in the letter of 27th April that a larger sum would be required; and instead of objecting to this, he had only directed further enlargements in the plan, obviously requiring increased expense. Long after this he had continued calling at plaintiff's office, and had got all the information he could out of plaintiff, his assistant, and his brother, and had actually an offer made to him to carry out the work by Messrs. Hall for the exact figure named by Mr. Fogerty in his approximate estimate. It was preposterous a client could thus get all the benefit of an architect's skill, and refuse to pay for it.

Chief Justice Monahan then summed up. It was a pity this case had not been otherwise settled. He was inclined to think that a sum must have been originally named, though the evidence was contradictory; but even so, it was evident subsequent enlargements had been made to the plans by direction of defendant, which made the architect no longer responsible for the excess. An architect, also, was not a builder, and could not be held to be entitled to no remuneration because the work could not be carried out for the exact sum named, the estimate being only approximate. Having commented on the several items in the claim,

The jury returned a verdict for the plaintiff for the sum of £45, being £10 for the first plan, and 3½ per cent. on £1,000, or £35, for the rest, credit to be given for the £6 16s. lodged in court.

THE PUBLIC HEALTH.

COURT OF QUEEN'S BENCH.

Mr. Norwood, LL.D., on behalf of the Lord Mayor and Corporation of Dublin, moved for an order to the sheriff to summon the Grand Jury of the city of Dublin, in order that bills of indictment might be presented to them against Daniel Richardson, tallow chandler, of Upper Stephen-street, for a nuisance caused by the noxious effluvia arising from his melting-house and candle manufactory, which are, it is stated, highly injurious to the health of the inhabitants.

The Lord Chief Justice—I trust the zeal of the authorities will not be limited to that nuisance, for there are a great many others that require looking after; and the most prominent amongst them is the Liffey, for which no one can be indicted!

Mr. Norwood—That would have been abated long since, if I could help it.

The Lord Chief Justice—Take care that some one does not move against you.

Mr. Norwood—I wish some one would.

The Lord Chief Justice—I only give you the hint.

Mr. Norwood read an affidavit made by Mr. Boyle, C.E., secretary to the Public Health Committee, which stated that Mr. Richardson was summoned for the above nuisance under the Sanitary Act, before Mr. Barton, police magistrate, on the 12th of May, but the attorney for the defendant objected to having the summons determined by the magistrate, and the defendant entered into a recognizance to abide the event of any proceedings which might be taken by the Corporation at law or equity.

The Court granted the application.

SOUTHERN DIVISIONAL COURT.

Mrs. Burke, milliner, Lower Merriemount, et, was summoned for an infringement of the Workshops' Act, 1867, by keeping a number of girls employed in a room, the dimensions of which were so small as to be injurious to their health. It appeared that there were 22 sempstresses employed in defendant's work-room, which was 16½ feet in length, 20 feet 9 inches in breadth, and 10½ feet in height. It contained 3,404 cubic feet of air, or 154 cubic

feet for each of the 22 persons, being only a little more than one-half of the minimum space requisite for health. Mr. Boyle, C.E., Dr. Mapother, and Sergeant Haltigan were examined in support of the complaint.

Mr. Norwood, LL.D., suggested that as this was the first prosecution in Dublin under the Act, and as the principal object of the Public Health Committee was to let the public know that the law would be rigidly enforced, his worship might make an order for the abatement of the nuisance, on the understanding that the costs (£1 per day) should not be enforced unless the offence were persisted in or repeated.

Mr. Eunis, on behalf of Mrs. Burke, said she had acted in ignorance of the law, and would give the Public Health Committee no reason to complain of her in future.

It was ordered that the nuisance should be abated within three days, and that provision should be made for 300 cubic feet to each person employed in future.

Messrs. Kurtz and Co., Sir John Rogerson's-quay, were summoned for allowing unwholesome effluvia to arise from their chemical works. Mr. John Norwood, LL.D., appeared for the Public Health Committee.

Dr. Cameron (City Analyst) deposed that he had visited the defendants' establishment four years ago, and found in a tank an immense quantity of gas liquid, upon which he poured an acid. The result of this was the emission of one of the most offensive gases known—sulphuretted hydrogen. The amount of gas thus disengaged was very considerable, and was felt at least a mile from the works. At the suggestion of witness, the defendants had furnaces erected for the consuming of this gas, and the nuisance was abated thereby; but about one year afterwards his attention was attracted to the defendants' works again, owing to the stench which came from the burning of tarry matter. The defendants then promised to have that nuisance also abated. Several complaints had since been made respecting the premises, and, on the 12th instant, witness again visited them. He then found a large aperture in the tank containing the gas liquor, through which the offensive effluvia were emitted. The gas and smoke were both very injurious to health.

Mr. Boyle, C.E., and police-sergeant 17 B having been examined in corroboration of Professor Cameron's statements,

Mr. Norwood said that, as the defendants had always been very willing to comply with any directions given by the sanitary officers, he did not press the case; but would request that an order should be made for the abatement of the smoke nuisance by discontinuing the use of the tar, and that a proper arrangement of furnaces should be made for consuming the offensive gases. This latter improvement could be made at a cost of 20s. or 30s.

To this order the defendants, who were represented by one of their employés, submitted, and his worship ordered the nuisance to be abated in seven days, in the manner specified.

PROCEEDINGS OF TOWN COUNCIL.

WE print below a portion of what took place at the meeting of our Town Council on the 19th ult. Alderman DEWITT in the chair.

THE DUBLIN AND DROGHEDA RAILWAY EXTENSION BILL.

The Town Clerk read a report from Committee No. 1, recommending that, inasmuch as the gradients proposed to be adopted by the bill, and the mode of crossing public thoroughfares was injurious to those resident in the rising district affected, the Council should oppose it in the House of Lords.

Mr. Byrne said they all knew that by the bill the railway company proposed crossing the road at the North Strand just below St. Laurence O'Toole's chapel, which the committee thought would be highly injurious to the neighbourhood. It might be asked why they now came forward with a recommendation exactly contrary to that contained in their first report—that they should not oppose the measure. But the fact was, they had been advised by their engineer that the objectionable matters would be removed, and

that opposition would therefore be unnecessary. At almost the last moment they found that the matters complained of had not been remedied, and that if some steps were not taken, this rising neighbourhood would be for ever disfigured. He therefore moved that, as they had neglected petitioning against the bill in the House of Commons, their law agent be instructed to obtain a *locus standi* in the House of Lords, and then they would consider what should be done.

Mr. Meagher seconded the motion.

The chairman said this was a very unfortunate transaction, and one which should be looked into. This bill had been referred to Committee No. 1, and they, in the usual course, recommended the Council not to oppose it. The measure, therefore, passed through the Commons, and the same committee requested them to oppose it in the Lords. He might tell them, as one who had had a good deal to do in parliamentary warfare, that they had not the slightest chance of success now. The law agent had just informed him that by obtaining a *locus standi* in the House of Lords they would only incur unnecessary expense, as their lordships acted in such matters within forty-eight hours, which would leave them (the Corporation) no time to take any steps whatever.

Mr. Byrne said the residents of the neighbourhood had a right to their protection, even though it should be at a cost of £100 or £150.

Mr. Meagher said that the gradients named in the bill were not even according to those specified by Parliament—in place of one in thirty they had left it one in twenty-five.

Mr. Smyth (law agent) said that if the residents of the district clubbed their means together, and appeared in the Lords by petition for themselves, stating that, trusting to the Corporation, they had taken no action in the matter while before the House of Commons, they would have a better chance of success than the Council.

DUBLIN PORT AND DOCKS BILL.

The Town Clerk read a report of a special committee to which the Dublin Port and Docks Bill had been referred. It stated that the committee, after having considered the clauses of the bill, with the assistance of Mr. Smyth, the law agent, passed the following resolution:—

"That a clause shall be inserted in the Dublin Port and Docks Bill, now before Parliament, to prevent the erection of any shed whatsoever on the quays from the first draw-bridge to Carlisle-bridge, and on the south side of the river from Carlisle-bridge to Moss-street. That in the event of the Port and Docks Board agreeing to insert a clause to the above effect, this committee will report to the Council that further opposition to the bill is unnecessary."

The report went on to state that the board had undertaken to insert the clause, and recommended that opposition to the bill be withdrawn.

On the motion of Mr. Norwood, seconded by Mr. Byrne, the standing orders were suspended and the report which had only come up for first reading, adopted.

SUGGESTED IMPROVEMENTS AT COLLEGE-STREET.

Mr. Dennehy, pursuant to notice, called attention to the dilapidated and unsightly condition of the wall of Trinity College bounding College-street. Amidst the improvements which were taking place, not only in other parts of the city, but in College-street itself, where a splendid building had been lately erected by the Provincial Bank, the appearance of the wall in question was disgraceful. It was a blot which could hardly fail to catch the eyes of strangers visiting the city. None could have a better title to remonstrate on the subject with the College authorities than the Corporation, for in 1591 Lord Chancellor Loftus obtained from the Corporation of the day the grant of the ground on which the College itself was built. In connection with the question of funds for public purposes in Ireland, Mr. Dennehy pointed out that under the Irish Parliament no less than £4,620,000 was granted for the improvement of various streets in Dublin, and £716,000 for public buildings. He submitted that it was the duty of the College authorities to take up the question which he now brought under their notice.

Mr. Norwood said the Council owed a debt of gratitude to Mr. Dennehy for his statement. A committee was still in existence, of which he (Mr. Norwood) was chairman, who were charged with the duty of carrying out this improvement, which, with others connected with the College boundaries, had occupied the attention of the Council for many years. They had had an interview with the directors of the Provincial Bank, who had met them in a friendly spirit; and he was not breaking confidence when he expressed a hope that those directors would contribute something towards carrying out the improvement in question. They had also had several interviews with the Board of Trinity College, who always expressed their willingness to grant from 12 to 18 feet of space for the improvement of the front of the College. With respect to the wall in College-street, the city

architect had prepared plans, which had been photographed, according to which it was proposed to have a railing similar to that in Nassau-street *. That being so, they were now in a position to go again to the Fellows of the College, and he trusted that they would contribute not only ground but funds. The entire work could be carried out for £1,300, of which the larger part ought to be contributed by the College. He would suggest, under the circumstances, that this matter should be referred back to the original Committee, with instructions to bring it again before the College authorities.

MISCELLANEOUS.

CONSOLIDATED NISI PRIUS COURT.—*McAnaspie v. Cormack*.—An action to recover £8 10s., alleged to be due for goods sold and delivered. Plaintiff is the well-known artist, Great Brunswick-street. He sold defendant, who is a builder, three lions in cement and a castelled top. It was proved by plaintiff's evidence that the articles, the price of which was the subject of the action, were delivered to defendant in good condition, a receipt to that effect, signed by defendant's principal man, being in the possession of plaintiff; that two of the lions and the castelled top were already made when defendant purchased them; that part of the material produced in court was admitted by defendant's witness to be cement of the best quality; and that the lions, &c., were retained by defendant for five weeks. The jury found for plaintiff.

A WONDERFUL CLOCK.—A clock which has just been completed for the Cathedral of Beauvais far surpasses all the existing specimens of the clockmaker's art. This wonderful piece of mechanism contains no less than 90,000 wheels, and indicates, among many other things too numerous to recite, the days of the week, the month, the year, the signs of the zodiac, the equation of the time, the course of the planets, the phases of the moon, the time at every capital in the world, the movable feasts for 100 years, the saints' days, &c. Perhaps the most curious part of the mechanism is that which gives the additional day in leap-year, and which consequently is called into action only once in four years. The clock is wound up every eight days. The main dial is 12 feet in diameter, and total cost exceeds £8,000.

England has a light for every 14 miles of coast, Scotland one for every 39½ miles, Ireland one for every 34½, while France exhibits one for every 123 miles. The lighthouses in France are more than three times as numerous as in Scotland, compared with the amount of coast, and nearly three times as numerous as in Ireland.

The question has been raised whether, if a bill is paid by means of a cheque, and the acknowledgment is in the words "paid by cheque," such a receipt requires to be stamped. In other words, it is asserted that the stamp on the cheque obviates the necessity of a stamp on the receipt. This assertion seems to originate in a misconception of the language of the statutes 16 and 17 Vic., c. 59, and 17 and 18 Vic., c. 83. The first-mentioned act grants a duty of one penny on drafts or orders payable to bearer, and a duty of one penny on receipts for £2 and upwards, to which there is but one exception allowed by the act, viz., receipts by a man for money deposited by a person to be accounted for to him. The third section of this act enacts that the duty on drafts and the duty on receipts may be denoted "either by a stamp impressed on the paper, or by an adhesive stamp affixed thereto." The tenth section of the later act enacts that penny adhesive stamps issued for receipts are available for drafts, and *vice versa*. There is clearly nothing in these enactments to warrant the notion that the stamp on a cheque obviates the necessity for a stamp on the receipt acknowledging payment by that cheque. The mode of receipting bills "as paid by cheque," so often adopted by over cautious individuals, is quite unnecessary, and for this reason — if a bill were paid by cheque, and the cheque were dishonoured, the proper course would be, not to sue for "goods sold and delivered," but to sue upon the cheque, because, by adopting the latter course, the plaintiff would have the benefit of the summary process under the Bills of Exchange Act, 18 and 19 Vic., c. 67.—*Solicitors' Journal*.

The municipal council of Bordeaux have under consideration a scheme which has for its object the cutting of a great ship canal from the Bay of Biscay to the Mediterranean. The proposer, M. Staal de Magnoncourt, estimates the cost of the work at 442,000,000 f. (less than £18,000,000), and the time necessary for its completion at six years.

New York erects 2,600 buildings this year. There are 80,000 lots covered now and 60,000 left. Therefore within 25 years every inch of Manhattan Island will be covered with brick and mortar.

GLASGOW CATHEDRAL WINDOWS.—A correspondent of the *Glasgow Mail* gives the following list of portions of the Munich glass in the Glasgow Cathedral windows, which, on close examination, he says he has found to be in a state of decay: In the great west window the enamel colour has disappeared from two beards, and there is only a faint indication of shadow colour on the bare surface of the glass. In the north transept window, presented by the late Duke of Hamilton, the enamel shading is cracked and partially flaked off from Deborah's foot and from an angel's foot, and the brown colour of Moses' beard and hair is peeling off. In the south transept window the brown upon Samuel's beard is partially decayed. In window No. 4 in catalogue the colour is peeling off from tressure of shield and mantling of Buchanan arms. In window No. 6 the beard of Jacob is changing from a deep brown to a spotty lightness. In window No. 13, presented by Sir Andrew Orr, the brown of Samuel's beard is off in flakes. In window No. 16 there are blemishes upon the brown shadow colour of a white tunic. In window No. 18 the pink dress of Queen Esther is discoloured; the purple enamel is peeling off and taking with it portions of the black outlines of drapery folds. In window No. 28 the warm brown colour of a youth's hair is cracked and partially peeled off. In window No. 32 an angel's pink mantle is much disfigured by blemishes in the shadows. [So much for foreign work.—Ed. I. B.]

LOOK TO YOUR WALL PAPERS.—The filthy custom of pasting one wall paper over another till a thickness of an eighth of an inch or more is accumulated, is too common in the houses of the lower classes, and attended with the worst consequences. This, as ascertained by the *Lancet*, was the cause of the puzzling offensive smell at Knightsbridge Barracks that recently threatened the whole establishment with fever. The examination of the drains and taking up of the floors revealed nothing, while the introduction of increased means of ventilation left the evil as it was. At last an examination was made of the wall papering when it was found that one paper was pasted over another till a thickness was accumulated amounting in one case to 14 layers. Between these layers there was rotten paste, in which fungi and even maggots germinated; while the wall being hollow, the stench spread into the passages and over the establishment.

Messrs. William Low and George Thomas, Civil Engineers, propose to connect the Lancashire and Cheshire line of railways by means of a suspension bridge between Liverpool and Birkenhead. The bridge to be of three spans, the centre being 1,800 feet in length, and the others 960 feet each, and to be 140 feet above high water-mark. The estimated cost is £1,750,000.

THE DUST BIN.—There is not one particle in the heap the scavenger removes from our houses that is not again put in circulation and profitably employed. No sooner is the dust conveyed to the yard of the contractor than it is attacked by what are called the "hill-women," who, sieve in hand, do mechanically what the *savant* does chemically in his laboratory—separate the mass, by a rude analysis, into its elements. The most valuable of these items are the waste pieces of coal, and what is termed the "breeze," or coal-dust and half-burnt ashes. The amount of waste that goes on in London households in this item of coal can hardly be conceived, unless the spectator sees the quantity that is daily rescued in these yards. It may be measured by the fact that, after selling the larger pieces to the poor, the refuse "breeze" is sufficient to bake the bricks that are rebuilding London. Most of the dust contractors are builders as well, and the breeze is used by them for the purpose of embedding the newly-made bricks into compact square stacks, which are seen everywhere in the suburbs of London. The breeze having been fired, the mass burns with a slow combustion, aided by the circulation of air, which is kept up by the method of stacking; and in the course of two or three weeks the London clay is converted into good building material. Thus our houses may be said to arise again from the refuse they have cast out; and not only are the bricks baked by their aid, but they are built in part with mortar made from the road scrapings, which is pounded granite, and combines very well with the lime and ashes of which the mortar is composed. Nay, even the compo with which some of the smaller houses are faced is largely adulterated with this particular refuse—*Quarterly Review*.

FLOATING SEA MARKS AND BUOYS.—An ingenious invention has been constructed by Commander E. W. Haws, R.N., assistant-inspector of Irish lights, having for its object an improvement upon the iron and wooden buoys now in general use. The bottom portion is made of wood and cork; from this rises a framework consisting of decks or compartments, and is covered with Indian-rubber, which gives it considerable buoyancy and lightness, and renders it almost indestructible, which will prove a boon to the

public service as well as to fishing vessels and coasters, —to the latter because when running foul of it in fogs and darkness it will not injure them, and to the former because from its floating powers and lightness it will not sink even if struck with the paddle wheel of a steamer and other casualties which sea-marks are liable to, whereas buoys made of the present heavy materials when struck generally sink and are lost, with anchors, chains, &c. Therefore, a considerable saving will be effected by this new invention, not only in its use, but also in its construction, the original cost being much less than that of the old metal buoys.

THE LIFEBOATS ON THE IRISH COAST.—Captain David Robertson, R.N., the Assistant-Inspector of Lifeboats to the National Lifeboat Institution, has, during the past two months, been engaged in inspecting the twenty-eight lifeboats of the Society on the Irish coast. Without a single exception he found the boats in admirable order, the crews expressing the utmost confidence in them, and the local committees manifesting everywhere considerable zeal in the management of the lifeboat stations. It may be stated that the Institution has expended upwards of £15,000 on these twenty-eight lifeboat establishments, and that the support of the Irish boats involves an annual expenditure of about £1,400, which is partly met by the parent society in London, and partly by local subscriptions.

TELEGRAPH EXTENSION.—THE FRENCH ATLANTIC TELEGRAPH, &c.—All the gutta percha core of the new French Atlantic cable has, we understand, been completed. The total length of the line manufactured is 3,350 miles, of which 2,700 miles have been shipped on board the vessels appointed to take part in the expedition, which is expected to start this month. The line, it may be noticed, will consist of two sections—one extending from Brest to the island of St. Pierre, and the other connecting St. Pierre with the mainland. The landing place on the American coast will, it is understood, be Cape May, New Jersey, opposite the Delaware River. Three ships will be engaged in laying the new cable. These are the *Great Eastern*, the *Scanderia*, and the *Wm. Cary*. The *Great Eastern* has at present on board 2,100 miles of the deep sea line, and the *Scanderia* 450 of the United States section. At present only a short length has been shipped on board the *Wm. Cary*. The manufacture of the British Indian line has, we believe, commenced, the insulation of the conductor having been begun. This cable will be somewhat longer than the French Atlantic line, and will consist of two sections, one stretching from Suez to Aden, and the other from Aden to Bombay. The total length of the system will be 3,600 miles. The submergence of the longer sections of the Baltic cable, namely, that which is to connect Bornholme to Libau—which was interrupted last year by the setting in of the ice—is to be attempted again this summer. General Smith, President of the International Ocean Telegraph Company, which controls the working of the line between Cuba and Florida, is now in England projecting an extension from Cuba to Jamaica, Martinique, and other West India islands. Two other cables are being manufactured—one for the Norwegian Government, and the other for a company which intends connecting Norway with Peterhead, in Scotland. During the present Lord Lawrence's term of office as Governor-General of India the number of miles of telegraph wire used for the transmission of messages was nearly doubled. It is probable that the arbitration in which the interests of the London telegraph companies are being considered will terminate at the end of the present month.

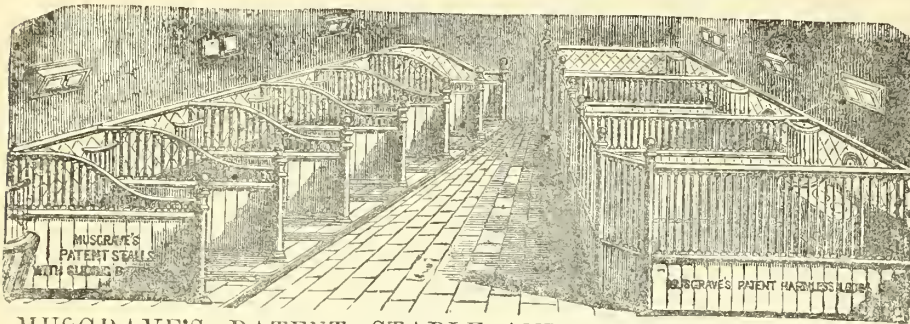
SCIENCE AND ART.—A striking instance of the immense value a small piece of steel may acquire by the great power of skilled mechanical labour is the balance-spring of a watch. From its extreme fineness and delicacy 4,000 weigh not more than one ounce, and its value £1,000. A most interesting little work, describing the rise and progress of watchmaking, has been published by J. W. Benson, 25, Old Bond Street, and the City Steam Factory, 58 and 60, Ludgate Hill. The book, which is profusely illustrated, gives a full description of the various kinds of watches and clocks, and their prices. Mr. Benson (who holds the appointment to the Prince of Wales) has also published a pamphlet on Artistic Gold Jewellery, illustrated with the most beautiful designs of Bracelets, Brooches, Earrings, Lockets, &c., &c., suitable for Wedding, Birthday, and other presents. These pamphlets are sent post-free for two stamps each, and they cannot be too strongly recommended to those contemplating a purchase, especially to residents in the country or abroad, who are thus enabled to select any article they may require, and have it forwarded with perfect safety.

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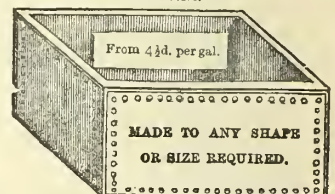
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The Irish Builder.

VOL. XI.—No. 228

Christ Church Cathedral.*



IN our number for 15th ult. we had an opportunity of merely acknowledging the receipt of a copy of this work, and printing an extract from its preface. We have since then carefully examined its pages, and found in them much that is original; even by those who have not met the works from which the author so largely quotes, the extracts themselves cannot be read without inciting the reader to lend a helping hand in the restoration of this ancient pile.

Should we venture on criticizing the merits and demerits of the work before us, it would be very far from our intention to deal harshly with the production of one who has lovingly and earnestly made an "humble attempt to arouse an interest in a Cathedral hitherto not sufficiently appreciated." That the book is not open to adverse criticism, no one, we venture to say, will be bold enough to assert. The author himself candidly acknowledges to its containing many inaccuracies and faults; into those we shall not minutely enter. The chief architectural and historical features pointed out by the author will more properly demand our notice.

"The origin of this Cathedral (writes Mr. Seymour) is almost lost in the obscurity of its remote antiquity; and there are many legends connected with it, based on ancient Irish traditions, which are more entertaining than trustworthy."

Of the fact that it was founded by the Ostmen or Danes, there can be little doubt, as well as that the site and cost of erection were given by Sitric, the Danish king of Dublin, in the year 1038. A few pages of the work suffices to bring the scant history of the Cathedral up to the year 1172, when we are told that—

From this date a new and brilliant era commences in the history of Dublin, which now became the capital of the English Pale, and was speedily enriched by the English settlers with public buildings, both of a civil and ecclesiastical character. Foremost amongst these works was the restoration of the Cathedral of Christ Church, of which Sir James Ware says, "that Laurence, Archbishop of Dublin, Richard, surnamed Strongbow, Earl of Strigul, Robert Fitz Stephens, and Raymond-le-Gros, undertook to enlarge this church, and at their own charges built the choir, the steeple, and two chapels; one dedicated to S. Edmund, King and Martyr, and to S. Mary, called the White; and the other to S. Laud. We find also another chapel in this church, in the south aisle, adjoining the high choir, dedicated to the Holy Ghost, but afterwards to Archbishop Laurence, after his canonization, and called S. Laurence O'Toole's Chapel."

* "Christ Church Cathedral, Dublin." By the Rev. Edward Seymour, M.A., Prebendary of S. Michael's, Christ Church Cathedral. Dublin; Hodges, Foster, and Co.

Nothing, however, now remains of these extensive works, of which the last trace was probably swept away in the fourteenth century by John de S. Paul, to make room for the present choir of Christ Church. But they were not long completed when the two most remarkable men of that period passed away, one of whom found his resting place within its precincts. In the year 1176 the great and powerful Earl Strongbow died, and his remains were solemnly interred, under the direction of Archbishop Laurence, in Christ Church Cathedral, and four years afterwards Archbishop Laurence himself passed away, and was buried at Augum or Eu, in Normandy.

The principal benefactors of the Cathedral in the twelfth and thirteenth centuries are mentioned, by whom it is supposed the greater part of the existing fabric was erected. Sir James Ware informs us that John de S. Paul, archbishop of the see, erected, shortly before his death, the whole chancel and the episcopal throne as it stood in 1658.

The progress of these works is marked by the various styles of architecture that prevailed during the different periods at which the edifice was erected. Thus the exquisite "transition" work of the two transepts, with their beautiful triforium-arcade of pointed arches, and the semicircular clerestory windows, richly ornamented with zigzag mouldings and supported by marble shafts, fixes the date of this portion of the cathedral at the close of the twelfth century—the style being transitional from Romanesque to the pointed or Gothic period of architecture that prevailed during the reign of Henry II. There is no doubt but that the choir was originally a work of the same period and style; but it is in vain to fancy what it had been unless we completely banish from our mind the present elongated choir, surrounded with wooden buttresses, like small sentry boxes suspended in mid-air, supporting nothing, and serving no conceivable purpose; the whole painted in imitation of oak, and surmounted with a row of vegetables that more resemble cauliflowers than any known object in creation. Mr. Street's recent investigations have demonstrated that the original chancel was very small and only large enough to receive the altar, for it did not much exceed 25 feet in length, as appears from the crypt beneath, which still remains an unerring record of the original design of the architect, and of his singular treatment of the eastern limb of this cathedral. In the crypt beneath, then, we must look for the outline of the original choir, and Mr. Street's description of it will give the best idea of what the chancel must formerly have been:—

"It has a semicircular apse, and the aisle is continued round the apse. East of this aisle are three chapels; but these, instead of having apsidal terminations, are square-ended, and their dimensions are very small—the central chapel measuring 17 feet by 15½ feet, and the side chapels 7 feet by 7 feet. In the angle between the apsidal aisle and the south-eastern chapel there are remains of what seems to be a circular turret, and I think it probable that similar remains would be found on the north side also. The whole plan is therefore not only clearly made out, but it is one of much picturesqueness of outline, and, to the best of my belief, unique in Ireland."

The most interesting, and by far the most important, portion however of this cathedral was that which was executed in the thirteenth century. There is no record to tell who it was that designed the nave, with its matchless arcade and graceful clerestory, of which Mr. Street so justly remarks that "if you can contrive to see through the whitewash, and to recover from the impression which the squalid look of the place at first produces, you will be able to realize that the design of the northern side of the nave is one of the most exquisite of its age. The beauty of the sculpture and of the mouldings is extreme, and the design of the triforium and clerestory really perfect."

The learned author quotes extensively from a report made last year for the Dean and Chapter by Mr. G. E. Street, with suggestions for the restoration of "one of the best and most refined works of thirteenth-century art of which Ireland can boast." He recounts the accidents which, from time to time, impaired this magnificent structure, and also notes the alterations and additions made. A sketch of the principal events which have taken place within the walls of this venerable building is given, and the gradual decline of its greatness and prosperity traced.

At page 40 we are told that—

The year 1562 is memorable in the history of Christ Church Cathedral. In it occurred the final catastrophe that has marred its pristine beauty, and

reduced it to its present unsightly and squalid condition. From want of that thrust supplied by the resistance of external flying buttresses, the massive stone groined roof gradually spread the walls asunder, and on the 3rd of April, 1562, it came with a crash to the ground, carrying along with it a large portion of the south arcade of the nave, and leaving the northern one sadly shaken, and much out of the perpendicular. The greater part of the west front too, which had probably a five-light lancet-window, was carried away in the crash, and the floor of the nave was raised to its present height by the debris of the groining and roof, which have never since been removed. The southern arcade was replaced that same year by the existing hideous blank wall, and the stone groined roof by the present mean and naked rafters. The floor was levelled and flagged over; and as no change whatever of any importance has since taken place, we may judge how completely this sad calamity has effaced the former beauty of Christ Church, by reducing it to its present deplorable condition. This niggardly and contemptible restoration is commemorated by the following laconic inscription upon this dead wall:—

THE RIGHT : H
ONORABL : THE : LO : OF : SVSSEX : LEVINT :
THIS : WAL : FEL : D
OWN : IN : AN : 1562 :
THE : BUILDING : OF : THIS : WAL
WAS : IN : AN : 1562.

At p. 72 the author communicates to his readers the fact that

"Christ Church Cathedral has long possessed ample revenues to maintain its efficiency, though not enough to enable the Chapter to engage in any work of restoration. The Report of the recent Royal Commission shews it possesses an Economy Fund derived from various sources, yielding in all £2,077 12s. 11d., out of which the Chapter expends £1,980 10s. 7d. in maintaining the clerical and lay staff of the Cathedral—the organist, choristers, schoolmasters, registrar, proctors, vergers, and church servants, and also in defraying the expenses incident to keeping the edifice in repair."

A perusal of the incomes and patronages enjoyed by the Dean and Chapter of this Cathedral will prove interesting to some who may be concerned in the measure at present before Parliament respecting the "Irish Church." As a non-political and class journal, the IRISH BUILDER is, of course, silent on any topic that may be passing in either the world of politics or religion.

The clock, placed in the tower about twenty years ago, was manufactured by Messrs. McMaster and Son, of Grafton-street. It is of great power, lifting a hammer of sixty lbs. and striking a bell of nearly two tons. It shews four dials made of slate, 8 feet diameter, with glass in the centre to light the clock-room. This clock has a peculiarly constructed *Remontoire* to the escapement, which keeps it independent of the weight. The pendulum is of very unusual length and weight, being nearly 18 feet long, the "bob" is a sphere weighing 600 lbs., which, from the correct construction of the clock, is kept in motion by a spring similar to the main-spring of an ordinary drawing-room clock.

The book has been creditably produced by the University publishers. The frontispiece consists of a photograph of the north arcade of nave as it is to be seen at present time; a map is given of the Liberties of Christ Church as surveyed in 1761; while ground plan and elevations made by Mr. Street have been reproduced, which add much to the value of the book. In a second edition we have no doubt but that Mr. Seymour will correct those faults both in arrangement and style, of which we must presume he is already cognizant.

THE ROYAL INSTITUTE OF THE ARCHITECTS OF IRELAND.

THE next ordinary general meeting will be on Thursday evening next, at eight o'clock. Mr. R. C. Millar will exhibit the "Apomecometer" lately invented by him. The annual excursion is proposed to take place on the 28th inst.

LABOURERS' DWELLINGS FOR IRELAND.

(Continued from page 129.)

ANOTHER idea has been brought out, patented, and adopted by a good many persons in the sister country. This is the invention of a Mr. Nicoll; it certainly is very ingenious and deserves description, which, however, it is not very easy to give in the absence of diagrams. The first process is to make frames of angle-iron about 9 feet long and 3 feet broad, or other suitable dimensions; these frames are made of iron 1 inch wide on each face, carefully secured at the angles, and provided with holes in the sides corresponding with each other from side to side, and also other holes through which bolts can be passed to secure the frames together when in position.

The next process is to form a layer of straw of the exact size of the frame, and about 3 inches thick; this is passed through a sewing machine specially prepared for the purpose, and sewn together, or quilted is, I believe, the proper term. The edges are then cut so as to remove loose straw, and make the quilt fit for the frame, into which it is laid after being passed through rollers so as to condense and consolidate the straw to some extent. When it is placed in the frame, bars or skewers of iron about 1 inch by $\frac{1}{2}$ inch are run through the sides of the frame and the thickness of the straw quilt, and secured by hammering down the heads after the manner of rivets.

Next, some twenty or so of these prepared gridirons with straw quilts, like beefsteaks impaled upon them, are piled on each other, and submitted to hydraulic or other pressure until the straw is compressed down to a thickness corresponding with the breadth of the iron frame.

Next, the frames thus prepared are placed in a bath, wherein each is coated with a thickness of about half an inch of a mixture of Seyssel asphalt and crushed stone, or other similar material; and when this is dry, the frames are ready for erection either as walls or roofs.

The process of erection consists of laying a foundation of concrete, and fixing to it a rib of angle iron; angle iron for quoins, pieces, and occasional T-irons, if required, for intermediate supports, and an angle-iron top rail or wall plate for the roof. To these and to each other the previously prepared frames are secured by bolts, and the holes in the asphalt left for putting them in are closed, and the exterior and interior are plastered with Portland cement formed into a fine concrete about half an inch thick, finished with fine stuff. Roofs, walls, and floors are formed of a similar mixture of materials, varied to suit the circumstances and position, the floors being recommended to be laid with half-inch deal for the sake of warmth, which would not last the trampling of hob-nailed shoes a single twelvemonth. The invention is recommended as affording a house at a minimum cost, which shall be absolutely impervious to moisture, unaffected by any variation of temperature, and perfectly incombustible. These are offered at prices which are very tempting. A four-roomed cottage, for instance, with scullery, pantry, &c., for £80 within fifty miles of London, to £105, according to distance. These last words are important; they point to a general rule as regards building—viz., that to be done cheaply its component parts must be produced near at hand; and even though walls may be reduced to a thickness of only 3 inches, yet if they have to be

carried to any distance the cost is enhanced enormously; but I do not believe in the system at all. It certainly is possible to get an unbroken coating of cement over a surface without a crack or flaw; it is possible to get a sheet of asphalt which will excel in solidity the pavements recently laid in this city; but without these two conditions being perfectly fulfilled, failure must soon result; and if the mice once got into the straw what nice quarters they would have. But as regards this country, the idea may be dismissed at once on this one ground—viz., that for less than the cost of the cementwork on these asphalted gridirons you can build a solid, substantial wall of masonry, and you have all the cost of iron, straw, asphalt, and carriage to pay for ordinary plastering and whitewashing.

But to leave these specimens of ill-applied ingenuity, and return to the more immediate subject. We shall find, if we can get rid of the cant and prejudice of the day, that the man whose wages do not exceed 18s. or 20s. a-week will manage to live comfortably, and rear a family morally and respectably, if he is provided with two rooms—one for the general living room, the other for a bedroom—but they must be rooms, not cabins. The living room should be about 16 ft. x 14 ft. at least, and the bed-room 14 ft. x 10 ft. or 12 ft. Such a cottage could be built in a plain manner, with slated roof, roughly plastered walls, timber floor in the bed-room, for about £50; but it would require a rent of about 2s. a week to be remunerative, and that is beyond the means of the majority of the class for whom it is intended, but it is not so far beyond the possible as compared with the means and resources of gentlemen who are improving their estates, as to drive them to utter despair of doing anything, as is the case with the plans and ideas of the modern nostrum-mongers about Labourers' Dwellings. It cannot be too long or too often insisted on, that the notions of the present day on this subject are utterly bad and worthless, and even noxious: 1st, because they cannot be generally carried out; 2nd, because when occasionally carried out, the examples produced form a scale by comparison with which other cottages are liable to be condemned; 3rd, because they deter people who have more sense than money from doing what they really might be able to do; and, 4th, that the cottages thus produced are a tax, a burthen, and a temptation to the unhappy occupier of them.

But before I close this paper I wish to bring before you a class of building which we are all familiar with, but are accustomed to look upon with such an amount of scorn and contempt that the very name of it has become a bye-word and a proverb. This is the age of rehabilitations; nearly every bad character in history, from Judas Iscariot downwards—even to Old Nick himself,—is being made out by one or other as not nearly so bad as he has been usually painted, and so I shall not be out of the fashion (although I am not led by it) when I ask you to dismiss prejudice and calmly consider the subject of building cottages of *mud*: but, in order to soften the shock, suppose we call it "*adobe*" or "*pisé*." The history of mud architecture we all must acknowledge to be of very respectable antiquity. I believe the earliest recorded "strike" was that of the Children of Israel at not getting the usual allowance of straw to make their bricks with. The presence of the straw proves that the bricks were never intended to be burnt: this trade or practice, thus hallowed

by the lapse of ages, exists still amongst us, but exists under circumstances of most unmerited contempt—unmerited I say deliberately, for, what does anyone want in a wall that a mud wall does not possess, that is to say within the range of proper use? The essence of a wall is to preserve equable temperature in the interior—cool in summer heats, warm in winter frosts,—this the mud wall does to perfection. Furthermore, a wall should be one which will not transmit moisture from the exterior by its extreme porosity, nor condense moisture on the interior by its extreme density—both of these points are of the utmost importance in this climate, and in both the mud wall exceeds every other material in practical use. It is essential also that a wall should be able to stand and bear the weight put upon it; and I think it not unlikely that to the mind's eye of many men will arise visions of cabin walls with ungainly props and buttresses, and rents that no other material but mud would admit of being stopped so as to provide for exclusion of air. But, has anyone, before condemning the mud wall, ever asked himself whether any wall would bear the thrust of the ill-trussed roof that is put upon it, or taken the trouble to ascertain whether it is not the carpentry of the roof that is at fault rather than the material of the wall; but, not to leave the matter to conjecture, I would ask why should not a mud wall stand, within certain limits defined by its power, as a mass to resist compression by dead weight, and disruption by a weight acting vertically to the line of its direction; why should not a mud wall—if not over-weighted, and protected from extreme shocks acting horizontally—to be to all extents a strong and durable wall? I grant readily you must protect its surface externally by dashing with mortar or whitening with lime, and inside with a rough coat of plaster; but forasmuch as you must do the same with rubble masonry, the next cheapest material with which you bring it into competition, these protective elements are common to both. Why should not our mud wall be strong enough, and if so protected, durable enough for all purposes? My own opinion is, that if our mud cottages were deliberately and carefully built, instead of being left to be run up by any one at the side of a bosheen at his own will and according to his own fancy—if some architect would apply his mind to it, and treat mud as a real, true building material, and describe the conditions under which it should be used—cottages affording the most comfortable accommodation, and quite as permanent, with the slightest periodical care bestowed on them, could be built for about one half of the cost of the cheapest cottages of the same area built of stone. £25 would be ample to cover the cost of such a cottage as I have described before, which could hardly be built for £50. I will not go into a complete specification of such a cottage, which would be tedious, and possibly unintelligible. I will only mention the following salient points, viz.:—The proper tempering of the clay, which should be treated as if it were the intention to make bricks of it; its proper selection also is important; a larger admixture of human or vegetable earth is fatal to the coherence of the wall. It seems paradoxical, after saying that, to dwell on the necessity of intermixing short straw in the body of the stuff; but the straw, although vegetable matter, is not decayed vegetable matter, and never will decay as long as it is imbedded in the clay, which it serves to bind

together and prevent from cracking in drying. Mud walls should always be built thicker than masonry walls, and it is good to taper them on the outside, and not build them too high. I would say for the wall of a cottage that 8 feet high to the eave is ample, and if the wall is made 2 feet thick at top, and tapered 1 inch to the foot in height, it will be 2 feet 8 inches thick at bottom, and will be able to bear the weight of a slated roof, although my idea has been to use thatched roofs,—a well-thatched roof is very light, therefore very cheap as regards the timber required, and will last without repair for at least seven years (I have seen many a thatched roof without any sign of dressing or repairing that must have been in existence for three times that length of time); it is like the walls themselves, equable in temperature summer and winter (a slated roof, if not concealed by a ceiling underneath, is intolerable in all extreme temperatures) and when at the end of time new thatch is required, the old will do its duty on the dunghap quite as well as if it had been, in the ordinary course of things, consigned to it years and years before. In one word, as regards labourers' dwellings, I think that instead of rushing off to new-fangled ideas, and imitating in them structures belonging to or intended for a different class of society, we should take the old fashions and improve upon them—use the old materials, and use them with the best ability we possess, and with all the light that modern study and learning can bring to bear upon them. The problem is one that, if broadly stated, answers itself: if a labourer with a little assistance as regards timber, &c. can build himself what is by common consent the most comfortable dwelling known, and at the same time one which is moderately durable, and this without art or science, and with the minimum of every resource, what may not be expected when the same thing is tried in the same method, assisted by experience and resources of time and capital not possessed by the day labourer.

Before I conclude I wish to mention—as we are on the subject of paradoxical building—a mode of building with stone which is contrary to all the established usages, but which, within certain limits, has one advantage which is of immense importance in many parts of Ireland, especially on the south and west coasts—viz., that of insuring a perfectly dry house; and what a boon this is, no one can fail of proving precious who has been a visiter in the parts I have mentioned. The mode I allude to and strongly recommend, is to build the walls rather thicker than necessary under ordinary conditions, and only to lay the outer edges of the stones on each face of the wall in mortar; extra care must be taken as to the introduction of thorough or bond stones, and the careful filling up of all interstices with small stones, and the walls cannot safely be carried beyond one storey; but all the gales of the Atlantic, laden with the moisture thrown off by the Gulf Stream, may beat against a house so built, and it will be as dry as it is possible for a house to be; and with ordinary care, there is no reason why walls so built should not be durable. Certainly, if you take into account the expense involved from removing paper-hangings, rotten timbers, and the other evils attending masonry walls in the localities I have indicated, the cost of removing the walls themselves at the end of some fifty years would be light in comparison of cost, and infinitely preferable to the eternal discomfort of damp.

DOINGS AT THE VALUATION OFFICE.

THE Select Committee appointed to inquire into the Valuation of Ireland met on Thursday, under the presidency of Col. French. The report of proceedings will be found below; it speaks for itself. The inquiry was not instituted a day too soon.

Mr. John O'Reilly, civil engineer and professional valuator of land, was the first witness called. He had been employed for 20 years and 21 days in the General Valuation Office in Dublin; was removed from the office by letter on the 16th of March, 1857; the cause assigned was alleged false statements he had made with reference to Mr. Greene; the charge he had made against that gentleman was for incompetence, he knowing nothing of the value of either houses or land; a knowledge of these matters was, in the opinion of the witness, essential for a superintendent of valuations; Sir R. Griffith, however, said that although Mr. Greene had not the necessary qualifications, he was competent to do his duty *under his* (Sir R. Griffith's) *superintendence*.

Chairman—Did you charge also that Mr. Greene was paid a considerable sum for hotel expenses in the country, when in point of fact he was never out of Dublin?—That is so; and it was proved that travelling expenses were also charged, which were illegal; there was a charge for a journey to Clare in 1856, which was never made; some little time before witness left the office a rule was made to give a month's pay on dismissal, and this was all he got *after more than twenty years' services*; he knew the late Mr. Kelly, of the Valuation Office; he had nothing to do with the preparation of the geological map exhibited at the Dublin Exhibition; but he wrote the first book of instructions in 1838, and afterwards compiled the others which were now in use. The books were prepared under the sanction of Sir R. Griffith; but Mr. Kelly's was the hand which wrote the books. Mr. Kelly told him that Sir R. Griffith asked him to what account he intended to charge his time when employed under Mr. Jukes at the Geological Museum, and that Sir R. Griffith wished the charge to be made to the survey of the counties. Mr. Kelly said he could not conscientiously make such a charge, whereupon Sir Richard said angrily—then I will pay it myself. Mr. Kelly believed that in consequence of this matter he had incurred the displeasure of Sir Richard. Witness, when in the office, was employed chiefly in the valuation of towns; he had valued Kinsale and the city; the system of valuing in threes or in squads was carried on for six or seven years; this was an inconvenient and costly system, and he believed that with a suitable staff the valuation of Ireland might be completed in eight years, but it had taken about thirty. He would employ two commissioners, thirty valuers, thirty draughtsmen, and thirty clerks; each valuator ought to have two assistants, and one of the commissioners ought always to be engaged in visiting the valuers. The expense of the annual revision was about £24,000 a-year; this was twice more than the revision ought to cost, after allowing for a more liberal scale of payment to the revisers. It was hopeless to expect any reduction under the present organisation. He would recommend the employment of local revision; he saw no reason why such revisions should be worthless after six or seven years; he knew a case in which a valuation had been raised for a political purpose; a Captain Nowlan, a guardian of the South Dublin Union, was objected to by Alderman J. Reynolds on the ground that his house and garden were valued at only £9 10s., and that he was consequently disqualified to sit at the board; the consequence was that he was obliged to retire; but the Valuation Office subsequently raised the value of his house to £12 on purpose that he might be qualified; this had been done under what was called a central system.

The O'Connor Don—But perhaps the house had undergone some change, which would

have increased the value?—Oh, no; for I went and examined the house myself, in consequence of the excitement which the circumstance occasioned in Dublin at the time. Did not think that farmers were proper persons to value land and houses. There was a person named Organ employed in the Valuation Office as librarian; his duty was to put away old maps and books, and he had an assistant to help him. Mr. Organ had also a situation as lecturer in convict prisons, and he carried on the two functions contemporaneously. A man named Skip was employed at the Valuation Office, in Ely-place, as porter or messenger, but he was in reality butler to Sir R. Griffith, and wore his livery. This man's son was employed in the office at 15s. a-week, and his mother was housekeeper or caretaker at No. 109 Baggot-street, where some of the valuation work was done.

In reply to questions from the O'Connor Don, the witness said Sir Richard Griffith justified the accusation which he had made against Mr. Greene for charging 10s. a-day hotel expenses in addition to his salary; there was also a charge about the journey to Clare, and another charge about a carpenter who was employed at the Valuation Office nominally, but really in doing work for Mr. Greene. That charge was partly proved; had seen him making window-shutters and doors, which had nothing to do with the Valuation Office, although he was paid 28s. or 30s. a-week, which was charged to the office.

The O'Connor Don—Do you know a person named Irwin in the Valuation Office?—Yes.

The O'Connor Don—And have you heard that a book was written during office hours, and that it was peculiarly offensive to the Catholics of Ireland?—Yes, the author of the book is a divisional superintendent, and he was assisted by some of the clerks, who copied the sheets for the printer; I have seen a copy of the book, which was purchased in the office.

Mr. Stacpoole—Do you mean that I, as one of the outside public, could have gone to the Valuation Office and purchased the book?—I cannot say that. There was a great deal of work done in the office when I was there that had nothing to do with the office. I did not report it, because I knew that the heads of the office knew all about it, and when I did report other things I saw I was dismissed. The book written by Mr. Irwin was on Ultramontanism, and a copy of it having been sent to me, I wrote him a letter, thanking him for it, to which I received a reply as follows:—

DEAR SIR,—You have no occasion to express your acknowledgment to me for sending you my book on Ultramontanism, as I assure you I never sent it to you, and I have no idea who did. However, as I have given some attention to the subject, I shall be glad to receive any opinions you have on the subject, as I am persuaded you must know more about it than I possibly can.—I am, dear sir, yours very truly,
J. O'Reilly, Esq. G. W. IRWIN.

In reply to further questions in reference to Mr. Irwin's book, the witness stated that he had every reason to believe it was written by Mr. Irwin, and that it bore his initials on the titlepage.

Some of the books of instructions were here handed to the witness by Mr. Ayrton, and in reply to a question he said he had done work by them, but a good deal of work was done in the Valuation Office which was not according to the books.

The committee then adjourned.

L A W.

COURT OF EXCHEQUER.—June 8.

Doolin v. Dixon.—On the application of Mr. Butt, Q.C., who appeared for plaintiff, a commissioner was appointed to examine the Rev. Mr. McNamara, who at present resides in Paris. The new trial of the case was fixed for the 20th October next. The Lord Chief Baron observed that this gentleman really ought to come to Dublin for examination, and that it would be a very improper thing of the community, who had the power to require his attendance, if they did not bring him over.

THE O'CONNELL TOMB.

We present our readers with a lithograph of the new Tomb lately placed in the crypt under Round Tower in Glasnevin Cemetery. A full description of this work of art appeared in our number for May 15th. It was designed and executed by Messrs. Earley and Powells, Camden-street Works.

SALE OF THE LATE WM. DARGAN'S PROPERTY.

THE sale of the property of the late William Dargan was held in the Landed Estates Court, on the 8th inst. The property submitted was situated in the County of Wexford, and the Town of Bray, County Wicklow.

Lot 1. Part of Wexford Harbour, north side, containing 657a. 0r. 22p. statute measure, held in fee-simple; net annual rent, £460 8s. 11d. Sale adjourned, biddings having reached only £7,000.

Lot 2. Part of Wexford Harbour, south side, containing 1,087a. 1r. 7p. statute measure, held in fee-simple; net annual rent, £744 2s. 7d. Adjourned, there being no bidding.

Lot 3. The islands, north side, Wexford Harbour, containing 149a. 2r. 35p. statute measure, held under a lease for three lives, all in being, or 31 years; net annual rent, £82 13s. 5d. Sold to Mr. Robert Hoey, for £950.

Lot 4. Main-street, &c., in the town of Bray, containing 14a. 1r. 15½p. statute measure, with houses and premises; held in fee-farm; net annual rent, £1,147 4s. 9d. Sold for £11,000 to Mr. R. J. T. Macrory, in trust for Thomas Baring, Robert Wigram Crawford, Thomas Hankey, and Baron Lionel N. de Rothschild.

Lot 5. Carlisle grounds, &c., Bray, containing 5a. 0r. 32p. statute measure, held in fee-farm; net annual rent, £256 5s. Adjourned, bidding having only reached £1,420.

Lot 6. The Marine Hotel (already sold by private contract).

Lot 7. The house No. 10, Prince of Wales'-terrace, Bray, held under lease for 900 years; net annual rent, £90. Sold to Mr. R. H. Durdin, in trust for Helen Elizabeth and Susan Hayman, for £990.

Lot 8. No. 11, Prince of Wales'-terrace, Bray; same tenure; net annual rent, £90. Sold to Mr. W. F. Littledale, in trust for L. D. Carnegie, for £1,050.

Lot 9. No. 12, Prince of Wales'-terrace, Bray; same tenure; net annual rent, £100. Sold to Mr. W. H. Jackson, in trust for H. V. Jackson, for £1,100.

Lot 10. Houses in Florence-terrace, Bray; same tenure; net annual rent, £278. Adjourned, biddings having reached £1,800.

Solicitors having carriage of the sale, Messrs. Barrington and Jeffers.

INSURANCE OFFICE ACCOUNTS.

THE question of a periodical examination of the accounts of insurance offices has been introduced into Parliament by Mr. Cave, and we cannot too strongly express our hope that the Bill will speedily become law, so that we may see more of the hidden machinery by which these companies are worked, and know the worst at once. It is not far wide of the truth to say that there is a very uncomfortable feeling abroad respecting the stability of life assurance offices, and it would be well if the offices themselves took the initiative, and satisfied the doubts of the public by throwing open their books and courting an examination. Experience has fully proved that no commercial venture is, or can possibly be, above suspicion in these money-making times, and we should be glad to hear that the wholesome example of the Peninsular and Oriental and the Royal Mail Steam Companies, in inviting an investigation of their accounts, was more generally followed. Where there is concealment there is always suspicion, and nothing but publicity can remove it. We are justified upon more grounds

than one in advocating that the utmost publicity should be given to the accounts of public companies, and especially to those of assurance offices. Unfortunately, the Civil Service has no assurance office of its own, and its premiums are spread throughout the kingdom. We need then scarcely point out the misery that would arise if it were ascertained that there had been any breach of faith in the management of these offices. There is already plenty of distrust, and between hopes and fears there is suspense. With the failure of a public company, mercantile or otherwise, there is not always commiseration; high-pressure dividends always bring risk, and we must take the consequences of the venture; but with life insurances the case is widely different. From this there is no recovery. An office improvidently managed will not only work its own ruin, but also the ruin of those connected with it—a result which inflicts the greater cruelty, as the only action taken by the investor is dictated by prudential motives, and if after a lapse of years an office is declared insolvent, the consequences to those insured are simply ruinous. Why, then, cannot Parliament, once and for all, pass a Bill declaring a public audit or periodical examination of the accounts of insurance offices imperative? and then possibly we should not hear of so many systematic frauds, nor be answerable for so much misery created in consequence of those frauds.—*Broad Arrow.*

ON ART AS APPLIED TO MANUFACTURES.

I HAVE been asked (said Mr. J. G. Grace to the members of the Artisans' Club at a recent meeting) to address to you a few words about Art; and I have great pleasure in complying, being sure that the subject interests greatly all those who are here met together.

What is Art? It is the representation of the beautiful; the holding the mirror up to nature, impressing its loveliness, adopting its forms, borrowing its colouring.

How beneficent are its influences, how humanizing, how pleasureable, how valuable! It is a mine of intellectual wealth to those who study it, and a most important source of material wealth to the country where it flourishes. By art the sculptor chisels from the block of marble a form thrilling the heart with admiration of its beauty. By art the painter records the noblest acts of our country's history, or inspires the keenest sympathy by his able portrayal of a domestic story. By art things the most ordinary are made objects of admiration and of real value; and it is this application of art to common things which is of such importance to the manufactures of a country. The practice of art, to be of real value, should ever be regulated by sound taste. The great French minister, Colbert, has said that "*Le goût est le plus adroit de tous les commerces*,"—a great truth which may thus be rendered,—"Taste is the most subtle and powerful of all elements of commerce." But what is taste? a question difficult to explain. It is a word that has many meanings: most people pretend to have taste; none like to think they have bad taste. I often hear the expression "That is *my* taste;" and how tastes differ,—

"Talk what you will of taste, my friend, you'll find Two of a face, as soon as of a mind."

So says Pope. A countryman has a taste for fat dumplings, and some ladies have a taste for chignons. The word "taste" is often, I think, misapplied, and the word "liking" might generally be substituted for it.

Taste, applied to art, I should express as a keen perception of the beautiful, regulated by experience and careful cultivation. Art, guided by taste, is never more satisfactorily employed than in adorning objects of utility, for utility and beauty should always be associated. I say art guided by taste, and not, as it often is, sadly misapplied. There is a book by a very able man, an honour to his country, Mr. Owen Jones, called "The Grammar of Ornament;" the book is, I hope, familiar to all of you,—it contains a multitude of examples of every period of art, all well classified,

from Nineveh downwards; this is a valuable boon to all thoughtful art-workers, but it is distressing often to see how these examples are misapplied by ignorant designers, and ornaments of various periods and divers styles commingled together. By true art, then, things the most ordinary are not only made objects of real beauty, but become specimens of real value.

The magnificent collection of terra-cotta vases in the British Museum shows how the art-workman of Etruria gave beauty of the most refined character to his vase of burnt clay. In those vases are combined purity of form, elegance of ornamentation, and exquisite design and finish in the outlined figures: that is more than can be said of the costly productions of the Imperial Porcelain Manufactory of Sèvres, at the present day.

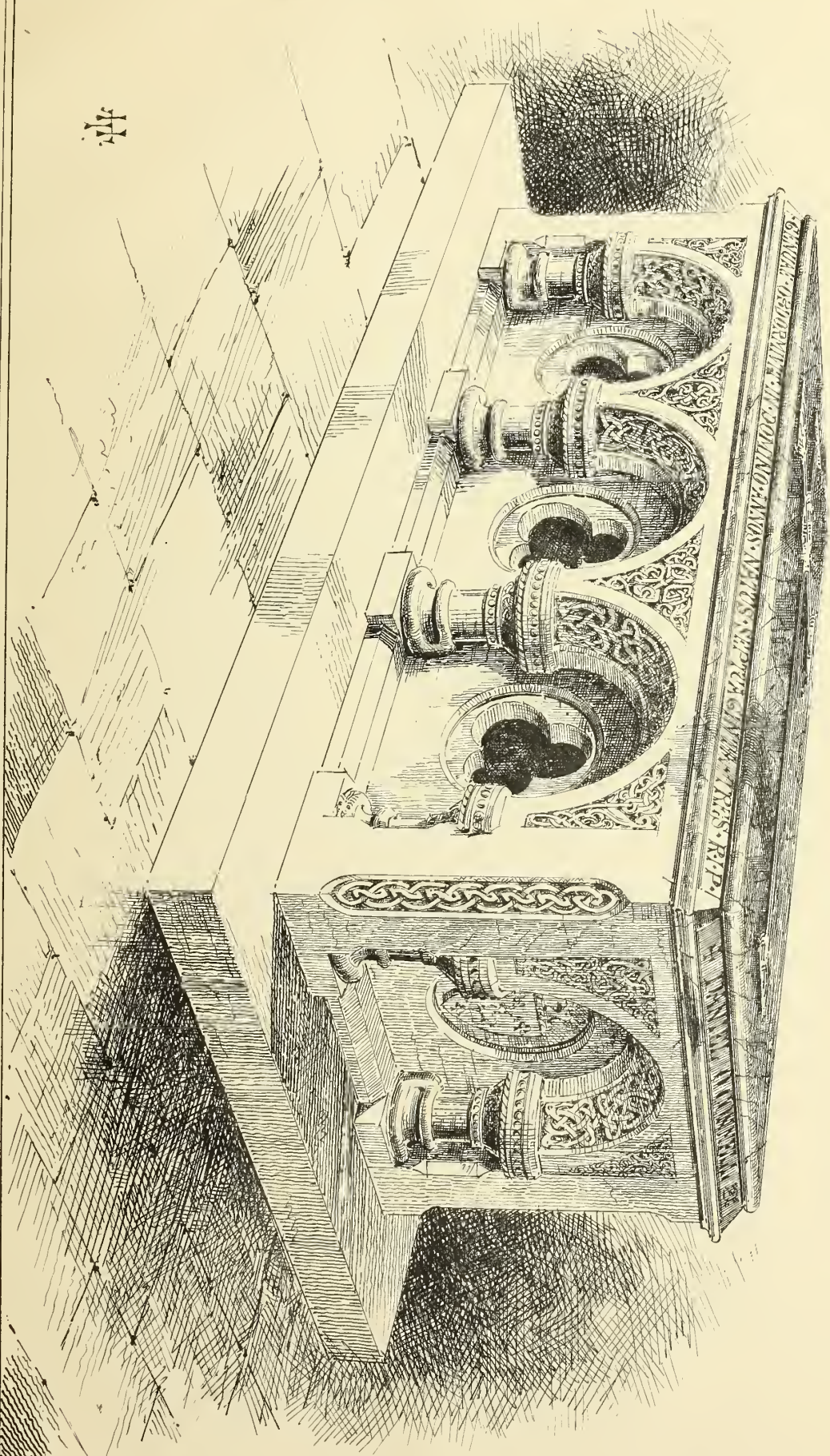
Side by side, however with those Etruscan vases may be placed the productions of our noble-hearted countryman Wedgwood, aided by the genius of our English Flaxman; glorious examples of what the unaided energies of one man can accomplish, when warmed by the true spirit of devotion to his art. Think of old Bernard Palissy too; think of his struggles through poverty, almost through starvation, to the realisation of his discovery. He made nature serve him for models of his work. He modelled in clay snakes, lizards, fishes, frogs, insects, all like life itself, enamelled in their natural colours by the process invented by this admirable enthusiast. Nor must I forget the lovely terracotta work of Luca della Robbia, whose productions as far as I am aware, are not known in any other material. At the South Kensington Museum are valuable specimens of his work in bas-reliefs, of Madonnas, children, figures, &c., teeming with gentle beauty and natural sweetness.

I think that in our modern productions of earthenware and porcelain, we are not sufficiently careful in the arrangement of the design: greater simplicity and greater purity are to be desired, especially in the ornamentation of common objects; for if the designs on these are in simple good taste, it would be an effective mode of diffusing the feeling for art among many. I allow that progress has been made within the last twenty years, but there is a dreadfully mistaken opinion in the minds of many manufacturers, that in making for the million they must employ vulgar, showy patterns, as suiting the prevailing taste. In this I think they are entirely in error. They have no occasion to descend into dull colouring and meagre ornament; that does not constitute purity or beauty; a design may be simple, of good drawing, in fresh and harmonious colours, and cost no more than dull or gaudy patterns.

In the manufacture of metal-work immense progress has been made of late years, and instead of heavy, clumsy works cast in moulds of outrageously incongruous design, beaten work is often substituted, and thus the skill of the clever artificer can be impressed on the object. . . . Most of you must have noticed in the Exhibition of 1862, in the Indian collection, metal bottles of elegant form and inlaid with silver in ornamental patterns of great beauty; and in Paris, in 1867, I remarked some exquisite specimens of metal-work, of chased work, bordered in parts with inlaid silver ornament made by an Italian artist for Mr. Layard.

I must not let my fancy, however, wander from my subject in descriptions of fine art, but confine myself to urging on the workmen of common things to study art, so as to throw into objects of ordinary use a pleasing form and a touch of beauty; above all, avoid the evil, too common in our day, of overloading a work with inappropriate and redundant ornament.

Let me next say a few words on textile or woven fabrics. These are of various tissues, and made for various purposes, but all are influenced more or less by this leading principle—that the fabric itself should, as far as possible, be the fundamental element of the design. In grass matting, for instance, the nature of the material and the kind of work



THE O'CONNELL TOMB

Designed and Executed by Henry & Powell, Carvers & Workmen

oblige a certain simplicity of lines or of geometric angular pattern. In the various kinds of carpets it is especially desirable that the design should be adapted to the nature of the material and its uses. In all it is essential that the design should be flat, and none of the objects represented with cast shadows. To walk upon ornaments in relief is as perplexing and disagreeable to the eye as it is objectionable in taste. The colouring of the carpets should not blaze away in bright contrasts of all the colours; a certain sobriety and harmony is particularly desirable in a floor-covering on which furniture is to be placed, and in a room on the walls of which are probably works of art. Not that I object to bright colours in carpets, for if they are properly brought together, a very quiet harmony may be produced.

The manufacture of lace by machinery has opened a wide field for a beautiful fabric, especially as applied to window-curtains; it is a very important manufacture, nevertheless it is exceedingly difficult to obtain appropriate and good designs in it. Plumes of feathers, large spreading ferns, or gigantic flowers are presumed by manufacturers to suit popular taste; they seem to ignore altogether beautiful existing patterns of guipure, or point, or other styles of lace, which have, however, been well imitated of late by some French manufacturers.

Cabinet furniture is a most important manufacture, in the superior branches of which art is a most material aid. I think the fundamental principle should be "truth in construction;" that this construction should be as simple as possible, and be evident,—afterwards ornament if you please, but let the ornament be appropriate in style and not redundant, let the carving be from the surface as far as possible, and avoid *appliqué* or stuck-on ornament. In the cheap, commonly-made furniture of the present day, the proportions are often faulty, the mouldings too strong, and, above all, they are overlaid with coarse, ill-executed carving, a hotch-potch of a bit of scroll, a bit of shell, and a bit of foliage, all grossly abused. But in most of the better class manufactories of cabinet furniture, I think, the taste is very good, fully equal to that of the French in the more ordinary objects; and by no means open to the sententious criticisms of some modern authors who, to corroborate their peculiar arguments, appear to have studiously avoided the more respectable houses, and taken their standard of the prevailing taste from the cheaply-made rubbish to which I have alluded; then they exercise this, and compare it, as the best existing furniture, with their own designs, which they have the modesty to describe as quite the proper thing.

We know that good work must be costly, because it takes more time and care than common work: the great aim, then, should be to obtain a good effect at as reasonable a price as possible, by adopting good form in the readiest way, and giving just sufficient ornament to have a pleasing effect, and no more. I think we have not hitherto paid all the attention it deserves to the Etruscan style of ornament for general purposes. It is a style which associates well with simple forms, and may be carried out with sufficient plainness not to be expensive; but the more simple the outline the more perfect must be the drawing; every contour must be well proportioned and graceful, and the workman who executes the work must have a feeling for it. The features of each particular style should be carefully attended to, not only in the general design, but in the details, especially in the mouldings, both carved and plain. A careful study of early Italian work will show that the mouldings are very delicately wrought, and great beauty and finish may be given by attending to this. In the form of chairs the outlines should be simple and adapted to the curves necessary to give comfort; much carving is not desirable, and it should never project beyond the surface.

There is probably no manufacture which may be made more easily available for diffusing taste among the people, than paper-hang-

ings. They are now so cheap that the home of the mechanic can be made to look tasteful and cleanly at small expense. About five-and-twenty years ago there was no manufacture in which good taste was so outraged, but the style has gradually much improved, and now neat, pretty papers can be had for one penny per yard. In paper-hanging great effect may be given by good borders of correct, quiet design and harmonious colour. There is a deficiency in borders of this class.

I have thus rapidly brought before your notice some of the manufactures which are directly influenced by the application of art, and have, I hope, shown how important it is that this great aid to manufacture be properly understood by the designer who composes each work. But the greatest assistance is given to this art-designer when his work is carried out by intelligent and capable workmen, who can appreciate the art-work, have a taste for it, and above all if they can draw themselves. Therefore I say to every man around me, learn to draw. Every man *can* draw: how he *will* draw must depend upon the thought and labour he bestows upon it. Examples for his study are not difficult to find: the common thistle, the wild flowers, the foliage of trees, the hop with its elegant and drooping foliage clustering around the pole; Nature, in all its forms and colourings, afford a never-ending series of studies: once the first difficulties conquered, it is a most pleasing as well as profitable employment; and, as I have already said, a workman who can draw understands art-work with better feeling. It is by such aid that the natural taste and talent of a man are developed; from the simple workman he may rise to be the art-worker of fine things himself,—of those productions that live from age to age, and are valued and loved by those who possess them; for, in the words of a true poet,—

"A thing of beauty is a joy for ever;
Its loveliness increases; it will never
Pass into nothingness."

INFECTION AND DISINFECTION.

THE above was the title of Professor Cameron's eleventh lecture, delivered on Saturday in the theatre of the Royal College of Surgeons. We print the substance of it. About twenty per cent. (said the learned lecturer) of deaths occur from zymotic, or preventable diseases, such as small pox, measles, hooping cough, scarlatina, &c. These diseases were each produced by a specific virus thrown off from the bodies of persons suffering from the maladies and absorbed into the systems of healthy persons. If it were possible to destroy the virus of infectious diseases it is most probable that such maladies as small pox, measles, scarlatina, &c., would never reappear to afflict mankind. The extraordinary concurrence of circumstances which produce a new disease is an event of excessively rare occurrence, and most likely never recurs. The spread of contagious diseases might be lessened, and some of them extirpated. Thousands of persons formerly died every year in Ireland of small pox, but by the simple preventative measure of vaccination this disease had now been stamped out in Ireland and in a few continental states, though it still was allowed to ravage England and most other countries. The use of disinfecting agents as a means of destroying disease should be strongly insisted on. The classic Greeks—who for the most part slept in their day clothes, and had no soap to use—employed perfumes to cloak the disagreeable odours which must have pervaded their apartments and clothes. Perfumes, however, did not destroy, they merely concealed the mal odour of the poisonous or unwholesome vapours, gases, and particles given off from the animal body. Fire was a great purifier. During the great plague in London fuel was largely burnt for the purpose of destroying the plague virus. In modern times many persons ridiculed the notion which dictated this attempt, but it was nevertheless most efficacious. Combustion causes ventilation, and ventilation is one of the most powerful disinfecting

agencies. Besides, the acid products of the combustion, and the particles of charcoal thrown in the air acted as disinfectants, whilst the mere heat destroyed the virus of the disease. The lecturer explained the action of heat upon contagion, and exhibited a diagram showing a hot-air chamber which had been erected by the Corporation in Marrowbone-lane, where clothes could be disinfected by hot air, at merely nominal charges. Dr. Cameron earnestly desired all who had charge of persons suffering from infectious diseases, to have their bed clothes and apparel disinfected in the hot air chamber, where they would not be in the slightest degree injured. If the general public used this chamber there would be much less infectious diseases in this city. The professor next exhibited and explained the uses, general and specific, of all the disinfecting agents in use or which had been suggested, namely, sulphate of iron, perchloride of iron, chloride of zinc, nitrate of lead, sulphate of copper, permanganate of potash (Condy's solution), lime, chloride of lime, salts of alumina, superphosphate of magnesia, charcoal, chlorine, bromine, iodine, muriatic acid, sulphurous acid, nitrous acid, carbolic acid, M'Dougall's powder, and bisulphite of lime. For disinfecting a room containing no inmates, the professor recommended nitrous acid, the properties of which he exhibited. By pouring nitric acid on copper filings a colourless gas is disengaged, which becomes red on exposure to the air. This red gas instantly destroys any organic impurity, sulphuretted hydrogen, &c., in the air. A moderate-sized room might be disinfected at a cost of 2s. 6d. It would be well to burn a few ounces of sulphur also, that article being cheap, and its fumes—sulphurous acid—being an excellent disinfectant. A pan of charcoal placed in a sick or even in an ordinary bedroom, helps greatly to keep the air pure, as does also a saucerfull of Condy's solution. For house sewage purification, Dr. Cameron recommended perchloride of iron, and also carbolic acid or M'Dougall's powder. Both destroyed low forms of life, and the latter prevented fermentation, and consequently the exhalation of injurious matters. Dr. Cameron said that absolute dependence should not be placed on disinfecting agents, but they were most useful especially when employed in conjunction with thorough ventilation, without which no house could be a healthful dwelling. The lecture was admirably illustrated by numerous diagrams and experiments.

THE ROYAL IRISH ACADEMY.

A GENERAL meeting of the Academy was held last evening: Sir Wm. R. Wilde presided.

The Very Rev. Dr. Russell read a paper "On the Duties upon Irishmen in the Kildare Rental Book, as illustrated by the Mae Rannail Agreement."

The Rev. Dr. A. Hume read a paper on the "First Fasciculus of his Glossary of the English Language spoken in Ireland (Hibernicisms)."

A valuable paper was also read by Sir W. R. Wilde on "Certain Antiquities found in the Counties of Dublin, Londonderry, and Queen's County." He illustrated the paper by exhibiting a number of antiquities, and presented some from North and South America.

The following gentlemen were elected members of the Academy:—Very Rev. Jas. Kavanagh, D.D.; James H. O'Brien, Esq.; John C. O'Callaghan, Esq.; Sir Thos. Tobin.

A BISHOP AMONG ARCHITECTS.—A late bishop being desirous of enlarging his palace, caused an architect to prepare plans of the proposed alterations; but when he came to know the estimated cost of the works, he declined to proceed. "What cheque shall I draw for your fees, sir?" said the bishop to the architect; who told him that, as the plans were abandoned, his charge would be a hundred guineas. "A hundred guineas! Why, sir, many of my curates do not get so much in a year." "Possibly," said the other; "but your lordship must remember that I am a bishop among architects."

ON THE DUTIES OF AN ARCHITECT WITH REFERENCE TO THE ARRANGEMENT AND CONSTRUCTION OF A BUILDING.*

(Continued from page 123.)

I SHALL now touch upon a few of the points to be thought of in the planning of a dwelling-house, and the working it out for execution. The relative position of each room in connection with all the others; the aspects of the windows; the communications, such as the hall, the corridors, and the staircase, required to be arranged for. Each room must be of the right size, shape, and disposition. In every main living room the ordinary articles of furniture must be prepared for, and places assigned them, and the same in every bedroom, large or small. The position of window, door, and fireplace in each room, must be settled, so as to avoid draughts, discomfort, and smoky chimneys. Light must be secured for every hole and corner all over the house, and so must ventilation. The service from the kitchen must be so provided as to bring the provisions into the dining-room readily, but to keep smells out. The duty of every servant all over the house must be understood, and all the endless appliances of a large house thought of. There must be a place found for the range and the hot-plate, and the jack, and the dresser, and the closets, and the shelves of the kitchen. The shelves, sinks, and plate-racks, the coppers and washing-boards, the vegetable bins and the water supply of the scullery, must be all provided for. Care must be taken of the wine-cellar, the beer-cellar, the stores, the linen, the china, and the plate. Ovens, shelves, books, safes, plate closets, linen closets, housemaid's closets, baths, hot water, cold water, cupboards, lifts, and all manner of appliances are to be thought of; rooms for the family, and rooms for the guests; the nurseries, the upper servants' rooms, the various services of butler, cook, housekeeper, footman, dairy-maid, stillroom maid, must all be thought of, all planned for; all must be brought compactly together, and each must be kept out of the other's way. Whilst these matters are being disposed of, there are also many points in the structure that need attention in preparing working plans. Proper foundations must be provided for, and an equable distribution of the weights on the walls. The flues must be carried up into proper chimney stalks, the construction of bressummers, girders, floors, partitions, roofs, &c., must be devised. The arrangement of the roofing, so as to be easily freed from snow, the mode of bringing away rain-water, the drainage, the outfall or cesspool for the drains, the necessary precautions against damp, bad smells, or tainted water, each and all of these must come under review, not one of them can be left to chance any more than the putting together of the masonry or the brickwork, the thickness of walls, the quality of glass, or the weight of lead.

As the plans approach completion, the architect has to advise his client as to the means of executing the building. In any case where an estimate in a lump-sum has to be prepared, a more or less elaborate document, called a bill of quantities, is got out. This is sometimes prepared by the architect, but in and about London it is customary for a separate professional man, called a measuring surveyor, or quantities surveyor, to make it out. In either case, this bill is supposed to show with accuracy the whole amount of every description of labour, material, or article introduced into the building. In London these documents are prepared in the most extraordinarily elaborate detail, as their extreme length will abundantly show; in the country they are generally more condensed. A blank copy of this bill is furnished to the builder who estimates, or to each builder if there are more than one, and he puts his own price to the items, calculates the amounts, and bases the tender he sends in upon the result so obtained. It sometimes happens

that the estimate thus obtained is at once agreed to and accepted. At other times it is desired to reduce the amount of it, and in this latter case the architect has to arrange such variations or omissions as will admit of this being done.

Without further delay, however, we will suppose an agreement as to carrying on the work come to somehow, a contract signed, and a commencement about to be made. The architect has now usually to seek, and appoint, and engage for his employers a clerk of works, and to set out the building in its exact position on the site, and to fix some unmistakable level. This done, work is begun, and, from that time to the close of the operations, the architect has personally to visit the building, and has also to keep on continually preparing additional explanatory drawings, and, I might as well add, to furnish duplicates, sometimes triplicates of working drawings, for the use of the contractor and clerk of works.

The objects which the architect has to keep in view during the conduct of the works, and especially during his personal visits to them are, in the main, two—he has to satisfy himself, first, that the contractor and every man he employs are doing their duty; and, secondly, that the building will carry out his intentions and supply his client's wants.

To establish that the conduct of the work is satisfactory, it is necessary constantly to watch the materials and workmanship, either brought upon the ground, or introduced into the building, or in preparation at the workshops. I need hardly add that, to do this efficiently, the architect must be a good judge of both work and material—an accomplishment requiring some amount of experience and attention. When there is a disposition to evade the conditions of a contract, this part of the architect's work becomes both difficult and responsible, and at all times a certain amount of anxiety is involved in it. To a very large extent, however, the inspection of workmanship and materials can be facilitated by the clerk of works, if he be clever and honest. He is placed on the works on purpose to see, every day and every hour, that the contract is carefully and honestly executed, and I must say that I have again and again received the most valuable assistance in this branch of my duty from various clerks of works engaged under me.

Drawings, explanatory of the original plans and specifications, are continually in demand. The larger number of them, perhaps, relate to the artistic part of the work, and consist of full-size profiles of mouldings and drawing of enrichments, or of details to a large scale, to show with precision and exactitude what is meant; but many structural drawings are wanted, and others are often called for to show modifications of the design, for there are few buildings in progress where some changes are not made.

It may be asked whether the architect has any means of enforcing the execution of the contract, in conformity to his directions and wishes, and I reply that he has such means. The hold upon the contractor, which all building contracts give the architect, is the power of the purse. Buildings are always partially paid for as they go on, and always upon certificates from the architect. It becomes, therefore, part of the architect's duty to grant these certificates, and, in giving them, he has to see that the amount certified represents the proper proportion and no more of the contract price, and that the work is properly done; for it is his duty to withhold his certificate if his complaints remain unattended to, or his orders are not complied with. In cases of work by a schedule of prices, very careful measurements are made from time to time; and, when the work is done in other ways, suitable valuations are made; but, in some shape or other, the architect requires to be armed with the only power which will effectually enable him to protect his employer and secure attention—that of controlling the cash payments.

When, at last, the work is completed, it becomes the architect's duty to make up a

statement of accounts. All claims for extra or additional works are checked and measured by him, or by the measuring surveyor for him, and the counter claims arising from the omission of work included in the contract, but not carried out, are valued. A balance is struck after every item has been scrupulously examined, and, if necessary, fought for. And the architect's last duty is the signing a final certificate that the balance, whatever it may be, is payable to the contractor.

I have now, I think, gone through the most salient points of an architect's ordinary duties, such as they exist when there are no accidents or bankruptcies, and no disputes, difficulties, obstacles, or other hindrances of any special magnitude; and, with the hint that such difficulties do not unfrequently arise, and impose on the architect's different duties, sometimes as a negotiator, at other times as an advocate, or again as an arbitrator, I might, I think, leave the subject. Yet, if you will bear with me a moment or two longer, and not think my tale a fable because I try to point it with a moral, I have something to add.

Perhaps the most obvious sequel to all that I have said is the inquiry, "If all this is needed for the success of a building, who furnishes a sufficient amount of care when there is no architect?" The reply is, that most of it is not furnished, and the building suffers; and, as to the remainder, either some skilled or experienced assistance must be employed, or else other work properly designed is copied, and thus a portion of that thought, without which a building cannot be built, is secured; and, lastly, that much of the time of skilled artisans is spent, where there are no regular plans and no skilled direction, in furnishing, imperfectly and piecemeal, substitutes for that which ought to be clearly arranged and laid down for the workman by the architect.

If I have said enough to dissuade any person from becoming his own architect, this paper will not have been without service. Though there is no mystery in the planning and direction of work, yet they require a very large amount of knowledge and familiarity with the work; and, though an individual who desires to build can, if he please, employ any number of men, and gain a good deal of experience in rectifying their mistakes, such experience is dearly bought, and comes too late for its purpose.

I have throughout studiously avoided giving prominence to the art side of this question; but here at least I must say that, however skilled a draughtsman or even a designer any private individual may be, he will be sure to be deficient in that technical knowledge which inspires the architectural treatment that a building receives from a good architect; here, at the best, defects are, to my mind, inevitable in the work of every man who has not measured and drawn much existing architecture.

Few persons readily understand that, because architecture deals with things quite familiar in our aspect of them to those who live in buildings, or buy or sell them, it is yet necessary to have long practice, in order to combine with economy and judgment the different parts of a room, and the different rooms of a house; and to provide a place for all that has to be included within its four walls. Almost as few recognize the fact that if they can draw an architectural feature when they see it, that power is quite different from that of the architect who has to draw a whole building and its parts as he imagines them, and then to furnish for every portion the profiles of the mouldings, the sizes of the panels, the treatment of the carvings to a large size. As a simple instance, it is easy for any person to draw a window with mullions, but no one who has not studied as well as sketched will be able to settle whether the width of the mullions should be a fourth, or fifth, or sixth, or what proportion of that of the adjacent light. The difference between a narrow and a wide mullion is equivalent to a total difference of style; a mullion of five inches would be out of place if one of seven inches was correct, and when it was done, the

* From a paper read before Society of Arts, by Mr. Roger Smith, April 28, 1862.

amateur would see that something was wrong, but would not know what; and it is to attain the power of regulating the half-inches in cases like this that the student of architecture has to wander for months, or even years, through the districts where good buildings exist, making notes and drawings; and, let me add, there is nothing short of a perfect knowledge of these details, and incessant attention to them, which can give harmony, unity, and character to a building.

It may be natural, and I hope it is not out of place to add, that the architect who does these services thoroughly has fully added the value of his fees to the value of the building. That he has quite work enough to do in earning them will be apparent to any one who turns over the plans and specifications of a large work, and forms some idea of the additional time spent in superintendence. I trust you may be willing to believe that the client has value received in the building for what he pays. The architect's remuneration, in ordinary cases, is, customarily and legally, a commission at the rate of five per cent. upon the cost of the works. This pays him very unequally, in some being sufficient, in others not so; but I believe it is a very fair way of payments as far as the employer is concerned, for it represents an increased standard of excellence throughout the building as compared with what, under the most favourable circumstances, might have been reached without the architect, and this increased excellence is really an increased money value.

In concluding, I should like to say a word as to some peculiar demands made sometimes upon an architect's skill, and to point out what he ordinarily cannot and does not do. No architect can make a bad builder do good work. He can make all sorts of agreements and stipulations that the work shall be good, and can try very hard to enforce them, but there is a certain proverb about silk purses and the materials suited for their manufacture which will help to illustrate the impossibility of success. It is as well to add, that the architect can materially help to secure a good builder, and that he can generally prevent a good builder from doing bad work.

The architect cannot, from the very fact that he is human, ensure perfection in every part of the work, but if he is able and careful his services carry the building a great deal further towards excellence than is often imagined, and though no amount of care makes it quite certain that every flue shall draw, and every lock shall work, that the arrangement shall be all that can be desired, and the effect please everybody, yet a skilled architect, working for a good client, will go a very long way towards this result.

The architect is not ordinarily called, as the engineer is, to calculate accurately the endurance of his materials, because his walls ordinarily must be thicker than the weights on them demand to keep out the weather, and his joists must be stiffer than is needed to support the floor, in order to prevent the ceilings cracking, and so throughout; but he has a great deal of that sort of calculation in which tables and experiments can but imperfectly guide him to perform. He has to judge of foundations, and the balance of weights in his structure; of the sufficiency of windows and passages; of channels for the supply or removal of water; of the probable effect on the eye of features not yet commenced; and of the suitability and durability of materials. Lastly, he has often greater difficulty in the management of men than of works, and the cross-purposes at which clients, builders, landowners, clerks of the works, foremen, and tradesmen are sometimes playing, often give him enough to do in his character of negotiator. Here, however, I do not propose to follow him. I have purposely kept out of sight much of what the architect has to do as an artist. I shall not be expected—if I say so little as to a side of his employment which ever demands his constant attention—to add anything as to other classes of duties or difficulties which are uncertain and irregular in their occurrence. I, therefore, here leave the subject, trusting that my paper may be judged

to have furnished a fair account, and nothing beyond a fair account, of the nature of the ordinary and routine occupations of these professional men to whom you are in the habit of entrusting the design and superintendence of the buildings you erect.

The chairman (Sir Digby Wyatt), in closing the discussion which followed the reading of the paper, said that he could not help feeling that the duties which an architect was called upon to render to his client had been, if anything, rather understated in the excellent paper of Mr. Roger Smith. One particular duty which had not been insisted on, but which was of great importance, was that of exercising patience. Another essential qualification was a combination of unselfishness and friendliness. It was important early in the negotiations to see what was the tendency of the client. Sometimes he might be a man with a great taste for art, but with limited means or heavy family claims, and if in a moment of selfishness an architect took advantage of that enthusiasm, and went on glorifying himself at his client's expense, he did that which was improper and reprehensible. Again, the relations between the architect and his client being reciprocal, it was his bounden duty to act as a friend to his employer throughout, and from the moment that was clearly understood all mistrust would be removed, and the happiest relations would be established. Another quality which the architect should possess was that of justice. It was necessary for the protection of the employer that contracts should be in very strict terms, and where the former was of a grasping disposition the builder was often so much at his mercy that unless the architect held a very fair hand between the two, great injustice might be committed. He should therefore strive, above all things, to earn in all his transactions a character for uprightness, taking care, on the one hand, to protect his client, but never allowing injustice to be done to the builder. In conclusion, he begged, on behalf of the meeting, to tender to Mr. Smith a cordial vote of thanks for the very excellent paper he had read.

CROMLECHS IN JERSEY.

We read in the Jersey papers, that two cromlechs, viz., those at Anneville and on Le Couperon promontory, have been restored by the exertions of the Rev. F. Porter. Apparently with the best intentions, but unfortunately with a mistaken zeal, this gentleman has replaced the fallen and scattered stones in such an arbitrary manner that the original Celtic architects would fail to recognize their handiwork. The Couperon cromlech, when first examined, had only two capstones of the supposed original seven in position; these have now been restored arbitrarily from the neighbouring stones which might be made to fit; also many of the nine vertical stones were displaced: they are now in a state "fit to be seen." The reverend gentleman set about restoring it to its pristine condition; thus "the space within the peristalith he did not examine, fearing his newly-executed work might fall in." We finally read, "This cromlech, as it now stands, is worthy of a visit from the antiquarian tourist." The tourist, doubtless, will be delighted, but the antiquary will be disgusted. If theories must be broached as to how and where such fallen stones were originally placed, let plans and elevations be discussed on paper; but if one gentleman may dispose of such remains according to his fancy, what is to prevent another from following the bad example and re-arranging them? After a few such restorations, it will be impossible for future scientific explorers to distinguish the modernized part from the original ruins, and these mementoes of the neolithic period will serve but to confuse archaeologists of succeeding generations. Measures are being taken to compare old plans with the remains as they are, and a strict investigation will be made as to how much has been altered, and to what extent. It seems that these restorations have been irregular and desultory, no proper

record of the proceedings being extant. Fortunately for Guernsey, the sites of most of the similar structures in that island have been purchased by gentlemen of thoughtful spirit, with a view to their preservation; but, even with this, it is impossible to secure some relics (witness the throwing down and breaking of the smaller capstones at Lancesse), and it remains for further measure to be taken. It is not improbable an Act of Parliament will be passed this session for the preservation of national monuments, on the motion of Sir Harry Verney; and pending this Act, the Scientific Societies have set on foot inquiries into the present state of monuments throughout Great Britain and Ireland. It is hoped that such an Act will be sent to be registered in the Channel Islands, and that it will prevent Vandalism.—*Athenæum*.

THE NEW AQUARIUM, ROYAL ZOOLOGICAL GARDENS.

The aquarium-house is a neat brick building, 54 ft. 9 in. x 32 ft. 2 in. The internal chamber, around which the tanks and ponds are arranged, is 40 ft. x 20 ft. Along the side facing the entrance are ten salt water tanks, each of which is 3 ft. 10 in. long, 2 ft. wide, and 2 ft. deep, and each containing ninety-five gallons of sea water. Two of these tanks communicate, so as to make one tank 7 ft. 8 in. in length. On the side in which the entrance door is placed are eight fresh water tanks of similar dimensions with those on the opposite side. At each end of the chamber are fresh water fish ponds, 24 ft. long, 7 ft. wide, and with a depth of water which can be regulated at pleasure. In one of these is a series of cascades. These ponds are stored with suitable fish, water-fowl, and aquatic birds. The fronts of the eighteen sea and fresh-water tanks are of plate-glass, the partitions of slate, the backs and floors of Yorkshire flag. A perpetual stream of water flows through each of the tanks. The water of the ponds is also continually in motion. The water is well aerated after having left the tanks, and is also filtered before it again enters them. The tanks are covered with strong, rough plate glass, dulled, so as to check an excess of light. The aquarium-house is floored with black and red tiles; the roof is open, stained and varnished. The house receives only the light which is transmitted through the water; it is furnished with a double row of raised seats along the centre, from whence the movements of the animals can be comfortably observed. The tanks at present contain good specimens of marine and fresh-water fish, crustacea, mollusca, and zoophytes, among which, perhaps, the most attractive are the gurnards, cuttle-fish, skates, lobsters, crabs, large eels, pikes, and tench. The natural beauties of these gardens, particularly at this time of year, will alone well repay a visit. The cost of the aquarium was about £1,700.

ASSOCIATION OF THE ASSISTANT COUNTY SURVEYORS OF IRELAND.

A MEETING of the council of this association was held in Belfast on the 3rd inst. In the absence of Bernard B. Murray, Esq., C.E., president, Mr. W. T. Henry, C.E., occupied the chair. Mr. Conway Scott, C.E., hon. sec., read the minutes of last meeting. From the correspondence it appeared that seventy-two assistant county surveyors had become connected with the association, which is only in the first year of its existence, and local secretaries have been appointed for each county in union. It was resolved that a general meeting of the association be summoned to meet at Omagh on Monday, 28th of June—1st. To receive the first annual report of the council; 2nd. To elect officers for the ensuing year; 3rd. To take steps to have clauses inserted in the new Grand Jury Bill, empowering grand juries to grant increased salaries and superannuation; 4th. To decide on next place of meeting, and transact general business.

BOOKS RECEIVED.

Report on the General State of the Public Works of the City. By Parke Neville, C.E., M.I.C.E., V.P.R.I.A.I., &c.

A copy of a portly volume, of which the above is a portion of its titlepage, has reached us. It purports to be a report of the various works executed in the City Engineer's department for the past eighteen years. Amongst the many subjects touched on by Mr. Neville are:—The plans for intercepting and utilizing the City Sewage—Ruinous Buildings—the Want of a Building Act—Description of Works for the Conveyance of the Vratry Water, &c., &c. Plans of the proposed Intercepting Sewers, and of the Waterworks, besides designs for the new Abattoirs, accompany the volume. We may have an opportunity hereafter of referring to it more in detail, and also of taking some extracts from it.

CORRESPONDENCE.

[It is to be distinctly understood that although we give place to letters of correspondents, we do not subscribe editorially to the opinions or statements set forth in same.]

PROPOSED RESTORATION OF CHRIST CHURCH CATHEDRAL, DUBLIN.

TO THE EDITOR OF THE IRISH BUILDER.

SIR,—A few weeks ago I chanced to meet with a pamphlet entitled "Report to the Dean and Chapter of Christ Church Cathedral, Dublin, on the Restoration of the Cathedral Church." By George Edmund Street, A.R.A." The report has been prepared (as we are informed in the opening page) by Mr. Street, at the request of the "Dean and Chapter." Preliminary drawings have been prepared by him for the works at present proposed to be done, the cost of which he estimates at £15,835!!! Now, what strikes me as being very strange in the matter is the fact of the Dean and Chapter having overlooked Irish architects, and shut them out without even giving them an opportunity of competing for the appointment. Surely this mode of treating an enlightened and respectable body ought not to be left unnoticed; the Dean and Chapter of Christ Church Cathedral would have been guilty of no breach of propriety towards Mr. Street nor of want of respect for his professional reputation, by consulting the brains and pencils of the Irish architects, whose abilities entitle them to a position as elevated as that attained by the profession in any other country. Probably the affair has not yet gone too far to be remedied; and that we may hope the Dean and Chapter, by reconsidering their movements, will do justice to native talent in employing the home profession to design and carry out the restoration of this fine old building.

A LOVER OF JUSTICE.

THE O'CONNELL NATIONAL MONUMENT.

The Honorary Secretary requests us to publish the following in reference to the progress of this monument, which our readers are aware is to be placed in Lower Sackville-street:—

SIR,—As many persons desire information regarding the progress made by Mr. Foley on the "O'Connell National Monument," I lately wrote to a member of the committee, at present in London, requesting him to ascertain the actual state of advance towards completion. Notwithstanding his numerous and urgent occupations, this gentleman visited Mr. Foley's studio, and on the very same evening wrote to state that the chief part of this great work were seen by him in process of manipulation. Mr. Foley, however, could not definitely state when the whole would be completed. It may be as well to mention that seventeen months have elapsed since the contract was signed for this work. He then assured our committee that it could not be completed under three years, in his opinion, and might even require a little longer time, owing to the complication and magnitude of the elaborate figures to be designed and cast for it according to the beautiful model exhibited.

JOHN O'HANLON, C.C.

THE CITY SEWAGE.

AGAIN the subject of the purification of the Liffey and the utilization of the City sewage has been before the Corporation. It is now sixteen years since the plan about to be adopted was, nearly in its entirety, laid before the Corporation by Mr. Neville. The following resolutions were passed at its meeting on Friday, that portion referring to the delivery of sewage at Ballybough-bridge being omitted:—

That the plan for the purification of the Liffey, as proposed by Mr. Bazalgette, C.E., and by our engineer, Mr. Neville, C.E., be carried into operation, in conjunction with a scheme for the utilization of the sewage, as proposed by Messrs. Barrington and Jeffers; and that the engineer be directed to prepare detailed plans, specifications, and estimates.

That this Corporation hereby adopt the plan of Messrs. Neville and Bazalgette for the city of Dublin main drainage by intercepting sewers, and that Mr. Neville be directed to prepare the necessary specification and working plans preparatory to advertising the contract for execution of the works, making provision therein for delivery of the sewage for utilization at or near Ballybough-bridge.

That application be made to the Exchequer Loan Commissioners for the loan of £80,000, or such other sum as may be sufficient, at 3½ per cent., for the carrying out of the work, on the security of £4,000 per annum, being one moiety of the sewer rate, and £4,000 per annum, being the surplus of the borough fund; and also on the sum, as yet unascertained, being the proportion of contribution which the outlying townships and country districts will be obliged to furnish to the original cost of the undertaking, as well as for the subsequent maintenance of the works.

That the plans prepared by Mr. Edwards (deposited with the Town Clerk by Councillor Byrne for inspection) for taking the sewage for utilization (upon the sands extending from Dollymount to the south of Howth Hill), from the pumping station at Ballybough, would yield to this Corporation a large revenue over and above five per cent per annum on the cost of construction, if carried into execution, which surplus Mr. Edwards estimates at over £20,000 per annum.

That a bill be promoted in Parliament for all the purposes above stated by this Corporation, and that the law agent, John Smith, Esq., be directed to prepare same without delay, and submit the draught to the Council, for approval, on or before the 1st day of August, 1869.

That the system of intercepting sewers, and project of utilizing the sewage herein referred to, being capable of execution and completion, if due economy be observed by the Corporation in all its departments, it be an instruction to the law agent that the draught bill referred to shall not contain any clause by which additional taxation shall or may be imposed on the citizens of Dublin.

STATUES.

It is with much pleasure we notice that the colossal statue of St. Augustine, 10 ft. 6 in. in height, has within the past few days been safely and cleverly raised to its position in the niche of the great tower of that splendid edifice, the Church of the Augustinian Fathers, situated in John's-lane in this city. This statue is, we learn, from the studio of Messrs. Earley and Powells, of Camden-street Works, and reflects great credit on them for the careful and artistic manner in which this important work has been carried out. We understand that other statues from the same firm are in progress, of a smaller size—viz., 7 ft. in height,—which are likewise intended for the Church of St. Augustine.

MISCELLANEOUS.

ROYAL HIBERNIAN ACADEMY OF ARTS.—His Excellency the Lord Lieutenant has selected for purchase the following works from the Exhibition of the Royal Hibernian Academy:—No 38. "Landscape of Cattle," by Alfred Grey. No. 49. "In the Beechwood—a study," by P. Vincent Duffy, R.H.A. No. 111. "On the Strand, Dublin Bay," by J. Alfred Atkin. No. 114. "H.M. Mail-boat Leinster leaving Kingstown Harbour," by Capt. Beechey, R.H.A. No. 172. "Howth Harbour," by J. R. Marquis, R.H.A.; and No. 354. "Posthumous Bust of the late Earl of Carlisle," by Wm. Millard.

THE NEW BRIDGE AT NEW ROSS.—The works at this bridge are rapidly progressing; all the piers are above the level of high water, and two lengths of the roadway are laid. It is expected that it will be opened for traffic in August.

The new iron lattice bridge at Oldbridge, replacing the wooden structure which was swept away the winter before last, was on Wednesday finally rendered up to the joint committee of the Meath and Louth Grand Juries by the contractors, Messrs Grendon and Co., of Drogheda. The manner in which the contract has been carried out is considered most satisfactory by the committee and their surveyor.

The statue of the Marquis of Westminster, from the studio of Mr. Thornycroft, London, has been placed upon the pedestal prepared for it in the Grosvenor Public Park, in accordance with the expressed wish of Lord and Lady Westminster. The pedestal of the statue has the following inscription, in gold letters:—"Richard, second Marquis of Westminster, K.G., the generous landlord the friend of the distressed, the helper of all good works, the benefactor of this city. Erected by his tenants, friends, and neighbours, A.D. 1869."

Under the head of "Broken English," a Paris paper places such Londoners as get smashed up by railway collisions, or who financially come to grief.

PHILOSOPHICAL HISTORY OF ARCHITECTURE.—In a recent letter to Professor Donaldson, M. Césaire Daly (of the *Revue Générale de l'Architecture*), who had been running after him on the Nile without success, makes some observations which have a general interest. M. Daly says,—"The Viceroy has named me Commander of the Medjidie. I have collected a considerable amount of data on the Egyptian monuments of all periods (old Egyptian and Arabian). I will forward to you shortly the most important document written by me since I held a pen. Now, our writers, without an exception, to my knowledge, have written volumes on the different styles of architecture, without ever giving a really scientific definition of what constitutes a style, and consequently nobody has undertaken to show scientifically in what genealogical, rational, and æsthetic relations the styles stand to one another. I have written what I might call a synthetical and philosophical sketch of the history of our art, from the oldest historical times until the present day. I have attempted even a step more: I have tried to discriminate, in the midst of modern confusion, the elements which are destined to combine together and to constitute the basis of a future style of architecture. . . . If the matter excites any interest among the English confraternity, I will perhaps go over to give explanation *vis à voce*. I have started with a programme of questions: the history of the arch is one of the points, and I have new data and new conclusions to produce on that subject: you will see shortly. In the meantime, I am sorry not to have met you somewhere abroad."—*Builder*.

LECTURE DEMONSTRATION.—Writing or figuring on a screen for Lecture purposes, by Professor Albert R. L. eds, of Haverford College, United States. Every Professor has proved how very unsatisfactory is the writing, the drawing, or any other manner of demonstrating his ideas by means of the usual board and chalk in a great hall. This difficulty may be removed in the following manner:—A glass plate is fixed into a Drummond or magnesium lamp, and a prism, which inverts the images, put on the fore part of the tube, which carries the objective. Now, if the lecturer, while he looks at the audience and speaks, writes on the glass plate with an ordinary quill and Indian ink in the usual way, from left to right, the writing will appear upon the screen and will be read by the hearers in enlarged letters. A coat collodion, blackened by its exposure to the sun, can be substituted with great advantage for a simple glass plate. On such a surface chemical and mathematical formulæ can be written, drawings of apparatus, machines, crystals, anatomical sketches be made with great exactness, and will appear in distinct lines upon a black ground, in appearance similar to an immense engraving in copper.

GOLDSMITHS' WORK.—The progress of fine art manufacture in this branch of trade is strikingly exemplified in a little work published by J. W. Benson, of 25, Old Bond Street, and of the City Steam Factory, 58 and 60, Ludgate Hill. It is enriched and embellished with designs (by Italian, French, and English artists) of Brooches, Bracelets, Earrings, and other articles suitable for personal wear, or Wedding, Birthday, or other presents, with their prices. Mr. Benson (who holds the appointment to H.R.H. the Prince of Wales) has also published a very interesting pamphlet on the Rise and Progress of Watch and Clock-making. These pamphlets are sent post free for two stamps each, and they cannot be too strongly recommended to those contemplating a purchase, especially to residents in the country or abroad, who are thus enabled to select any article they may require, and have it forwarded with perfect safety.

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Law and Architecture.



Are compelled to resume this important subject by the result of the proceedings in the case, *Gibbon v. Moore*, tried at the sittings after Trinity term in the Court of Common Pleas, a full report of

which we give in our present number. We do not know whether our article of June 1st came under the notice of the defendant or his advisers or not; it would certainly have done them some good to "read, mark, learn, and inwardly digest" the observations we then made on the case of *Taylor v. Hall*, and our report of the charge of the Chief Justice in that case, and they might have been spared the trouble and expense of a severe contest thereby. However, by continuing their resistance, they have, though unintentionally, done good service to the architectural and surveying professions, by causing another most useful decision to be given, fully recognizing the principles advocated by us on that occasion, and finally settling an important question in architects' and surveyors' practice.

The usage of the trade, as proved in the case of *Taylor v. Hall*, and recognized by the Chief Justice in his charge, was, as our readers will remember, that when tenders are required for a building the architect employs a surveyor to take out the quantities, who is paid for so doing by the builder who gets the work, or any modification of it; the builder very properly charging the item in his estimate against the employer. But should the employer accept no tender, or abandon the work, as there is then no builder to whom the surveyor can look for payment, the employer becomes directly liable. The reasonableness and legal force of this usage have been already decided in two important cases given in the legal appendix to Professor Donaldson's work on specifications, by W. C. Glen, Esq., namely—*Armstrong against Bowdidge and Moon against the Guardians of the Witney Union*. In both these cases the plaintiffs were building surveyors who had taken out quantities, by direction of the architects, for works which were afterwards abandoned; and in both cases they recovered in full against the employers. The case of *Mr. Taylor* differed somewhat, as the work was not abandoned, but partly carried out; and he accordingly brought his action and recovered against the builder. In *Mr. Gibbon's* case, however, there was an exact parallel, the work having been wholly abandoned; accordingly, he laid his action against the employer, and has very properly recovered the full amount against him.

During the examination of the first witness, the Chief Justice, with the recent experience of *Mr. Taylor's* case before him, and with that love of justice and fair play, and laudable desire to diminish as much as possible the cost and bitterness of legal contests which distinguishes him, remonstrated with the leading counsel for the defendant on the absurdity of continuing the contest at a grievous waste of time and money. It is the

inalienable right of every true Briton, however, to bring or defend an action whenever and to whatever extent it pleases him, and in the exercise of this the defendant persisted to the end; and perhaps it is as well he should have done so, as the verdict obtained is far more satisfactory than any settlement or compromise at that stage could be. He has done much to enlighten not only the public, but also the professional mind on the subject; as although it was proved that his architect had advised him of his liability, and fully endorsed the surveyor's claim, there are not wanting architects in this city whose ideas are either so hazy, or whose principles are so weak, as that they would encourage him in resisting the claim, or else hold back from expressing any opinion on a matter in which no architect of sense and intelligence should entertain a doubt.

The grounds for resisting this claim, as put by the counsel for the defendant, were as follows:—1. That he had never seen the plaintiff, or authorized his employment. 2. That he had authorized the employment of the plaintiff, but under a special agreement that under no circumstance was he, the defendant, to be liable for his fees. 3. That the plaintiff was employed under an arrangement to be paid by the builder whose tender should be accepted; a tender was accepted, and therefore the builder alone was liable. We believe it is considered allowable in defending an action to file several defences which may be inconsistent and contradictory, and this furnishes an example of what are called "legal fictions." *Quocunque modo rem*; and as we are not regarding the matter on this principle, we may freely criticise the above three statements by first observing that they are wholly irreconcilable with each other, as well as with common sense and the proved facts of the case. That the defendant "had never seen the plaintiff" is no reason why he might not get the benefit of his work, and be liable to him for it. How many counsel get fees from clients whom they never see, and how many merchants order goods from correspondents whom they never know but as such, it would be hard to determine. That he did authorize his employment was placed beyond any doubt by the documents in which the surveyor's name was mentioned, which were admittedly read over and approved by defendant and his solicitor before any of the work was done. It was fortunate for *Mr. Gibbon* that the architect managed all this part of the business with the most perfect openness, and that the documentary evidence was so complete. This disposed of the first objection, and also of the last; for, as remarked by the Chief Justice, the clause which specified how the surveyor was to be paid mentioned that it was to be "on the receipt of the first instalment," clearly implying a perfected contract, and not a mere tender accepted. It would be indeed extraordinary and most unjust if, by any construction to be put on either the law or the agreement, the builders, Messrs. Crowe, who never got any of defendant's money, could be held liable, especially when it was proved that they were ready and willing to carry out the work with first-class securities, but for defendant's change of mind. This flimsy pretext, therefore, would not avail. There remained the second objection, resting on the statement of defendant that he had expressly stipulated with the architect, that under no circumstances was he to be liable for the surveyor's fees. But this, again, was flatly at variance with the documents, which

specified that the builder was to charge the surveyor's fees at the foot of the estimate; so that, in the event of the work proceeding, the employer would undoubtedly have to pay them through the builder, and all the arrangements were made with that view. And even apart from this, the alleged special contract was preposterous, and improbable on the face of it. What solicitor or merchant would give his services or his goods on such terms? Architects are clever men, we know; but it would be just as reasonable to expect an architect to get the surveyor's work for nothing, as it would be to expect him to get the building erected on the same terms. The law and common sense, which, according to the Chief Justice, mean the same thing, require that any such absurd and unjust conditions as these should be proved by the strongest evidence before they can be acted on; and so far from this being the case, the evidence was quite the other way. And further—as *Dr. Boyd* observed to the Chief Justice during the retirement of the jury,—supposing the architect to be foolish enough to enter into any such absurd compact with the employer, that was no answer to the surveyor, who had no knowledge of it. The verdict was quite in accordance with the justice of the case, and we hope will prove a useful lesson to those who think that architects' and surveyors' claims, when made in accordance with the proper usages of their profession, can be resisted with success. A few more such decisions as this, and those we recorded in our number for June 1st, and these usages, will be as well known and fully recognized in this country as they are in England.

While on this subject, we cannot but remark that the eminent counsel for the defendant, in his difficulty to find something to say for his client, indulged in the following sapient observation:—"Whatever may be the case in that wealthy country over the water, can furnish no rule for us in this poor country." To follow out this argument, if it can be called such, because this is a poor country therefore honest labourers such as architects and surveyors are to have their claims resisted, and be expected—as the plaintiff was in this case—to give their work for nothing. Verily this is a grand means of making a poor country rich. But why stop at architects and surveyors? Why not include the members of the legal profession as well, who too often, we fear, promote litigation in cases such as this, where they ought honestly have advised a prompt settlement? We cannot exactly see, also, why the mercantile and trading classes are to escape, and be enriched at the expense of the others. However, the present case shews that members of the architectural, surveying, and building professions are quite as much entitled to their legal rights as any other class of citizens. There is not the slightest reason why their rules of practice and charge should not be of equal force, legally and otherwise, with those adopted by the Bar, solicitors, and the medical profession.

So far from there being any reason for a less rate of fees being charged in this country as compared with England, there are several good reasons why a higher rate might fairly be charged. In order to equalize the proportionate amount of remuneration in the two countries, the rates per cent. would require to be greatly increased in Ireland, for the simple reason that the sums on which it is chargeable are here so miserably small as compared with what they are in England. Architects and surveyors in London get the

same rates of commission on works like the Charing Cross and Midland Railway Hotels, costing each about £200,000, as an Irish architect and surveyor would get on a shop in Grafton-street or Capel-street costing perhaps £1,000. We need hardly speak of such works as the new Government Offices and Law Courts, on which the outlay is to be reckoned by millions. In England, too, the regular professional charges are simply paid as a matter of course, whereas here an architect or surveyor is too often expected to allow his bill to be taxed by some attorney, who knows as much of architectural practice as he does of Sanscrit or Hindustani, or else must fall back on the disagreeable alternative of an action at law.

Mr. Gribbon deserves much credit for bringing this matter to a proper issue, as Mr. Moon and Mr. Armstrong did before him. Had he consulted his own personal inclination he would probably have refrained from prosecuting his just claim, as he is well known to be a man of peaceable disposition, but the effect would have been most injurious. Dr. Boyd, his junior counsel, deserves much praise for the zeal and assiduity with which he worked the case. The two able Queen's Counsel associated with him were engaged on the heavy libel case in the Queen's Bench, and scarcely appeared at all, and he was left to fight the battle against three counsel on the opposite side, two being men of such calibre as Mr. Macdonogh and Mr. Butt. However, "thrice is he armed who hath his quarrel just," and so it proved to be in the present instance.

THE ROYAL IRISH ACADEMY.

THE Academy met at their house, 19, Dawson-street, on Monday evening, Sir ROBERT KANE, V.P., presiding.

The minutes of previous meeting having been read, and a member admitted,

The Chairman said that information had been received of the death of the Rev. James Henthorn Todd, D.D., who had been one of the most distinguished members of the Academy. He had held the office of secretary, and was afterwards elected president of the Academy.

On the motion of Dr. Apjohn, seconded by Sir Wm. Wilde, a resolution was adopted to the effect, "That, as a mark of respect to the memory of Dr. Todd, the Academy do at once adjourn for a fortnight, and that the Academy attend the funeral of deceased on Friday morning."

The deceased was son of the late C. H. Todd, a distinguished surgeon of this city. After taking the usual degrees at Trinity College, the rev. gentleman became, in 1831, Fellow of the University, and was co-opted a Senior Fellow in 1850. Dr. Todd filled the office of President of the Royal Irish Academy for the usual term of five years, also Precentor of St. Patrick's Cathedral, Librarian to the University, and Regius Professor of Hebrew. He was principally known for his lectures on "Antichrist" (the Donnellan lecture at Trinity College). He was also the author of "A Memoir of St. Patrick's Life and Mission," "Discourses on the Prophecies relating to Antichrist," "The Search after Infallibility," and other works." He edited some of Wycliffe's works, including "The Last Age of the Church," and "An Apology for Lollard Doctrines." He also edited several ancient Irish manuscripts, amongst which may be mentioned the "Martyrology of Donegal," and "The Book of Hymns of the Ancient Church of Ireland." He likewise edited "An Account of the Wars of the Danes and Norsemen," from MSS. in the Burgundian Library at Brussels, and the Library of Trinity College. Numerous papers were contributed by him to the "Transactions" of the Royal

Irish Academy. He was the founder of the Archaeological Society. As an Irish scholar, he occupied an eminent position in the various learned and scientific bodies of Europe, and by his generous munificence in founding the Archaeological Society, he gave a stimulus to the study of the ancient literature of his country.

SOMETHING ABOUT EYES.

THE eyes, says a writer in the *Scientific American*, have been called "the windows of the soul," an expression more poetical than scientific, unless we accept the belief that all living things, including corporations, have souls, which we are far from doing. We are even inclined to doubt that certain individuals of the *genus homo*—animals, supposed by many to have the exclusive monopoly of souls—really possess any, though they have sharp eyes to the "main chance." But whether a soul looks out of an eye or not, it is physiologically and scientifically an intensely interesting object. Dr. Dick has most justly remarked that "the eye is one of the nicest pieces of mechanism which the human understanding can contemplate."

The ball of the eye consists of three coats, the outer one of which is called the sclerotic coat. This coat is white and opaque, and constitutes what in ordinary parlance is called "the white" of the eye. In front this coat has a circular opening, very much like that in the case of an old-fashioned bull's-eye watch. In this coat is set the cornea, and is continuous with the sclerotic coat, being attached to it at the edge of the circular opening above described. The cornea is as transparent as any substance known to mankind. Inside the cornea is the choroid coat, which immediately surrounds the fluid called the vitreous humour, also a perfectly transparent substance. The choroid coat has a circular opening in front, to which is attached an annular curtain, which has the power of contraction or dilatation to adapt itself to varying intensities of light. This curtain is always coloured, and it gives rise to the popular classification of eyes with reference to colour, by which they are said to be black, blue, gray, &c. This curtain is opaque, and its contractile power depends on a set of annular muscular fibres, arranged concentrically around a circular aperture in the middle of the curtain, which aperture is what is called the pupil of the eye. Another set of muscular fibres arranged transversely to the circular set, pulling in all directions from the centre of the pupil, enables the latter to become larger when more light is needed for distinct vision. The cornea projects somewhat through the above-described opening in the sclerotic coat, making the ball of the eye more convex at that point. Directly underneath it at this point lies a fluid called the aqueous humour, which is so enclosed by the surrounding tissue that it forms a concavo-convex lens of the form called in optical works a *meniscus*. Directly behind this lens there is another body—the crystalline lens—which is also enclosed in the tissues so as to form a double convex lens, the front surface being less convex than the hindmost one. The mass of the eyeball is filled with the vitreous humour. The optic nerve penetrates the eye-ball on the back side below a point opposite the pupil, and passes obliquely upward, spreading out upon the posterior internal surface of the choroid coat, and forming what is called the retina. The office of the lenses above described is to concentrate the light in a proper manner upon the sensitive retina, from which the impression is transmitted to the brain by means of the optic nerve.

The eye is moved in all directions by means of beautiful muscles attached to the outside of the ball, one of which is an exact counter-

type of the mechanical element—the rope and pulley. This is the muscle which turns the eye obliquely towards the opposite shoulder, and is always used when we look at an object so placed. It passes through a loop at the top of the socket, and is then attached to the eye-ball; when this muscle contracts, the eye-ball is rolled inward and forward. This muscle has been considered as one of the most striking evidences of design in creation to be met with in the entire range of natural range.

Volumes might be written upon the eye and the phenomena of vision, but what we have said will serve as a prelude to some curious facts in regard to eyes of inferior animals as well as those of the human race.

Dr. H. Power, in a recent lecture before the Royal Institution in London, asserted that very few animals are destitute of eyes. The *protozoa* and simplest animal forms seem to have no eyes, and such is the case with the polypi, which throw out arms to catch their food. Animals of the tapeworm class also have no eyes, probably because they live in darkness, and find a plentiful supply of food in the bodies of their patrons. The *radiata*, or star fishes, have only very doubtful organs of vision. Most of the *mollusca*, including the oyster and the scallop, have very good organs of vision, and nearly all animals of a higher order than this class are furnished with eyes.

Some sea animals have eyes in their forehead; others have them in the brain. Some have plenty of eyes all along their sides or under their bellies, while others have them on the tips of their tails. The common snail has very good eyes on the tops of its horns, and the dragon-fly has more than 28,000 eyes.

Baer, an eminent German physician and oculist, says that blue eyes are capable of sustaining a much longer and more violent tension than black ones, and that the strength and duration of the sight depend upon the colour of the eyes. We do not see any grounds for this statement, and therefore do not give it credence. The same author also remarks that black eyes are more subject to cataracts, which is perhaps the case, although we do not deem it as fully established. According to this writer, not one in twenty possessing black eyes are satisfied with their colour. This may be true in Germany, but we hardly think it correct for the United States. Our readers will remember that the "Merican Frau," who was so extremely fascinating at "Hans Breitman's Barty" had eyes of "himmel blue," which corroborates the statement of the learned Dr. Baer as to the German preference for eyes of that colour.—*English Mechanic*.

ST. BARTHOLOMEW'S CHURCH, DUBLIN.*

THIS new and handsome edifice, in the Early English style of architecture, provides accommodation for some of the many Protestant inhabitants of a very improving suburb of Dublin, which forms a portion of the large Irish estates of the Earl of Pembroke; the district assigned to it has been duly constituted out of the parishes of St. Peter (in which the church is situated) and Donnybrook. A few years ago green fields, and not houses, surrounded the site. Now large and fashionable dwellings, constructed according to the most approved designs, stand around; and, in fact, in no other neighbourhood, not even excepting Rathmines and Rathgar, have so many improvements been effected within so short a period.

The site for the church "having been granted by the guardians of the Earl of Pembroke (under authority of the Court of Chancery), and funds contributed for the building of the same, partly by the Ecclesiastical Commissioners for Ireland, and partly

* From the *Armagh Guardian*. Prepared for the Third Part (not yet published) of "Brief Sketches of the Parishes of Bootstown and Donnybrook, in the County of Dublin, with Notes and Annals," by the Rev. Beaver H. Blacker, M.A., Vicar of Bootstown, and Rural Dean.

by private subscription, the foundation-stone was solemnly laid, with prayer and praise to the Most Holy Trinity, by Thomas, third Viscount De Vesci [one of the Guardians], on the Festival of the Ascension of our Lord, 1865." The designs were furnished by T. H. Wyatt, Esq., the eminent London architect, and were carried out satisfactorily by Mr. James Scanlan, of Dublin; and the building, having been completed (with the exception of the spire) at a cost of about £7,000, was consecrated by the archbishop of the diocese on the 23rd of December, 1867. Both outwardly and inwardly it presents an imposing and ornamental appearance. There is accommodation for 550 worshippers; all the sittings are free and unappropriated. The patronage is vested in the Archdeacon of Dublin, who holds the parish of St. Peter.

The Pembroke Township Act (26 and 27 Vict., cap. lxxii.), "for the Improvement of Pembroke Township [within which this church has been erected], comprising Baggotrath, Donnybrook, Sandymount, Ringsend, and Irishtown, in the Barony of Dublin, and County of Dublin," was passed in the year 1863; and the beneficial results of the measure, as already evidenced by the greatly improved appearance of the locality, have not in any wise disappointed the hopes of its promoters.

Not far from the site of St. Bartholomew's stood Baggotrath Castle, of which frequent mention may be found in Irish history. Mr. Joseph Huband Smith read a paper respecting it, and the manor attached thereto, before the Royal Irish Academy, in the year 1856 (as given in the "Proceedings," vol. vi. pp. 304-311), and exhibited a drawing from a sketch by Gabriel Beranger, about the year 1760; also a curious MS. plan of the array of the Parliamentary forces of the garrison of Dublin, as drawn out before the battle which took place in 1649, when the royal army, under the command of the celebrated Marquis (subsequently Duke) of Ormonde, sustained a defeat, the disastrous effects of which ended in the ruin of the royal cause in Ireland. This plan, without name or date, is preserved in a valuable collection of old maps and drawings in the Library of Trinity College, Dublin, and has been noticed, amongst others, in a paper read before the Academy by the late Mr. Hardiman, in 1824. Mr. Smith also exhibited, in illustration of his paper, an enlarged copy of Rocque's map, or "Survey of the City and Suburbs of Dublin," published in 1757, on which is laid down the line of road from St. Stephen's-green to Ball's-bridge, over the river Dodder; on the north side of which road is shown on the map the site of Baggotrath Castle. The original structure was built some time in the twelfth century, as appears from several notices of it in the public records; and Mr. Smith brought forward several interesting extracts from the Memoranda Rolls of the Court of Exchequer and Patent and Close Rolls, illustrative of the history of its possessors at different subsequent periods. The latest structure, the ruins of which were standing within the memory of many now living, was a massive square tower, built, as there can be little doubt, about the time of King James I. or Queen Elizabeth. The last remarkable event in connection with it was an attempt made to fortify it, which resulted in the battle of Rathmines, fought on the 2nd day of August, 1649, the details of which have been recorded by Edmund Ludlow, who held a high military command under the Parliament, and at greater length by Carte, in his "Memoirs of the Duke of Ormonde." It was never afterwards repaired, but suffered gradually to moulder into ruin, and was for many years the dreaded resort of freebooters. The office of governor is stated to have been, although a mere sinecure, filled up from time to time, and a salary paid, down to the period of the Legislative Union of Great Britain and Ireland, when, with other appointments of a similar character, it was abolished, and compensation awarded to the governor, Sir John (subsequently Lord) De Blaquiere.

ENGINEERS FOR INDIA.*

THE following letter has been privately circulated by its author amongst the profession, since its original publication:—

As the recorded opinion of a well-educated engineer, himself of much more than average natural ability and practical resource, it is worthy of attention. The notion of practice forming part of the curriculum for engineering, however, is far less new even in the United Kingdom than it would appear to be to Mr. Stoney. To go no further than his own university, that of Dublin, Sir John M'Niel, C.E., for several years conducted the practical examination of the school of engineering, which has since devolved on Prof. Downing, himself a practical engineer. In other countries, France for example, the *Cour d'Etudes* of the *Ecole des Ponts et Chaussées*, provides for examination in practice at the later period of the course.

There are great difficulties in making any really practical examination practicable, as no one ought to know better than Mr. Stoney; and for ourselves we are by no means convinced of their extreme importance. "Cram" can be got up for that as well as for theory.

In any case, what is first needed is the incorporation of the engineering profession in some way, so as to give unity and authority to this or any other educational plan.

TO THE EDITOR OF THE ENGINEER.

"Your recent leader on Indian Engineering induces me to make a few remarks on the present system of competitive examinations for professional appointments. A liberal education and scientific training are now generally considered as necessary a preparation for the engineering profession as the same or literary acquirements are deemed requisite for other learned professions; and the present competitive system is, perhaps, the best that can be devised for testing purely theoretic attainments; but the great defect of Government examinations is that they do not sufficiently test practical knowledge. To insure this, I would recommend that the young candidates be examined—first, in the general subjects which are embraced in a liberal education, and in those branches of science which are required by the engineer; and having passed a satisfactory examination in these, I would then require the candidates to spend one or two years in practical instruction on actual works, and during this period their proficiency should be tested by half-yearly examinations in practical matters relating to construction, these examinations being confined to practice and not going again into abstract theory. Thus, the first examination would test the efficiency of the candidates in those branches of general education which all gentlemen are supposed to acquire, as well as their range of scientific attainments. This preliminary examination being passed, the student would not be required to maintain so familiar an acquaintance with mathematics and physical science as a merely scientific examination requires, but could devote himself thoroughly to mastering the practical details of his profession. Thus, on the one hand, we should have well-educated scientific men in place of the half-educated men that are but too frequently turned out as three or four-year pupils of engineers, and, on the other hand, we should avoid giving appointments requiring practical knowledge to the equally useless men of mere book-learning, such as are many of those trained in the schools of engineering attached to our colleges, until they have spent a year or two in practice. Another advantage would result from having strict practical examinations, namely, that the men who are now crammed up or merely qualified in small engineers' offices, where no works of importance are either designed or carried out, and whose certificates of a year's pupillage are, therefore, no guarantee whatever of real practical knowledge; these men would not pass out to India to learn there, if ever they do learn, the practical knowledge which they are already supposed to have acquired at home.

* From the *Practical Mechanic's Journal*.

To carry out a scheme such as I propose, it would be necessary that the Government give some small salary, say £50 each half-year, to men who, having passed the first examination successfully, are studying the practical part of their profession, such terms being annexed to this as experience in similar cases may dictate; but I believe pretty frequent examinations in practical knowledge should form an essential part of the programme. This project requires, of course, two classes of examiners—1, professorial, such as the Universities supply; 2, professional examiners, namely, engineers in actual practice and engaged in the execution of works of considerable importance; and the practical examination should embrace so extensive a range of subjects that it would be adapted for men trained in one or other of the many departments into which civil engineering is subdivided, namely, harbour, railway, hydraulic, sanitary engineering, irrigation, &c., suitable answering in one or other of which subjects would qualify the candidate for his final appointment, the limit of age for which might be advantageously extended to 25 years.

The foregoing remarks apply to county and local surveyorships, as well as to Indian appointments, and, *mutatis mutandis*, might, I believe, be advantageously applied to the medical service and the Royal Engineers, and, in general, to all Government professional appointments where a high standard of education and practical skill are required."

BINDON B. STONEY.

NOTES OF WORKS.

The foundation stone of a new church was laid at Ennis on Wednesday last.

Killiney Church, Co. Dublin, was re-opened on Sunday last, after considerable alterations and painting, &c.

The new Masonic Hall, Limerick, was dedicated on St. John's Day. In the absence of Lord Dunboyne, Provincial Grand Master of North Munster, the ceremonies were conducted by James Spaight, Esq., J.P., Deputy Provincial Grand Master. A grand banquet in the evening was given to the members of the various lodges in attendance.

A new Roman Catholic church is to be erected at Edgeworthstown, Co. Longford, according to plans and specifications by W. F. Caldbeck, Esq., architect.

BALROTHRY UNION (Lusk).—At a meeting of the board of guardians of this union, held on the 26th ult., J. P. Byrne, Esq., J.P., in the chair, Mr. J. J. Lyons, of 25 Westmoreland-street, was duly appointed architect to the board, and directed to prepare drawings and specifications for a new or modified chapel, and to examine and report on the state of the workhouse generally, and especially with reference to the ventilating towers, which are said to be in a very defective, if not dangerous condition.

The directors of the Royal Bank, Foster-place, are about opening a new branch office in Upper Sackville-street. The contract for the works has been taken by Mr. Samuel Robinson, of Westland-row; they will be executed from the designs and under the superintendence of Mr. Charles Geoghegan, architect to the bank.

Alterations and additions are about being commenced at Kilmere Cottage, Killiney, for William W. Harris, Esq., under the directions of Mr. Charles Geoghegan, architect.

Extensive additions are being made to the College of St. Stanislaus, near Tullamore. They consist of new students' church and refectory with campanile, and alterations to present public chapel. Same architect.

Considerable progress has been made at the Institution for the Catholic Deaf and Dumb, Cabra, in the erection of new refectory and chapel, the latter being nearly ready for roofing. The east wing, to complete the original composition, is about being commenced by Messrs. A. and N. Hammond, contractors. Same architect.

DOINGS AT THE VALUATION OFFICE.

WE resume our report of the proceedings before the Select Committee appointed to inquire into the Valuation of Ireland.

Mr. George Hitchcock—Had the counties of Mayo, Galway, Sligo, and Clare in charge; brought a few of the documents ordered by the committee to be produced, and had asked for the others, but Mr. Shaw, of the Valuation Office, would not give them to him. He said he would only obey the orders of the Commissioners, and not of the Select Committee. [Witness here put in some rent-books used by the valuers for the tenement valuation.] These, as also the agreements, were used in working out the valuations. Cavan was the only northern county in which he had done any work. There was no uniform scale of taxes deducted in the office. Having described the manner in which the tenement valuation was carried on, witness explained that there were not the same facilities for ascertaining the value under the townland valuation as under the tenement. The applotments were made in the country, and in some cases were subsequently checked in the office. He had maps of Mayo, Clare, and Galway made several years ago, and they were still in a good state of preservation. It would take a man a couple of days to mark the tenement boundaries on an Ordnance map. There is a charge for the annual revision of the county of Galway for 1868, to Mr. W. J. Burke, but he died on the 16th of July, 1867. He (witness) did not authorize the charge. Was in the habit of making a return to the paymaster every month, showing what were the expenses of the revisers for the month.

Mr. Ayrton—But when a man died, I presume the money due to him was paid to his representatives; and in that way a man's name may appear in a pay sheet after his death?

Witness said that might be, but, in reply to the chairman, said that a payment in respect of work done by Mr. Burke in April, 1867, "had no business" to appear in a pay sheet of 1868!

The O'Connor Don—Have you heard of work being charged to counties which was never done for them? I have.

The O'Connor Don—In your own counties? Yes, in my own counties.

Some progress returns were here handed in, and witness said that the time spent by Mr. Hope in the Dublin Exhibition Building in 1863, from June to December, was charged to counties.

Col. Forde—But did every county get its own share? Oh! I cannot say that.

Mr. Ayrton—I suppose the Valuation Office was on exhibition at the Exhibition.

By the O'Connor Don—A charge was made in respect of Mr. Campbell's time to the county of Cork. It was first charged to the county of Tipperary, but afterwards charged to Cork. Mr. Campbell's work so charged was done in Sir R. Griffith's private office, and was not done for the county of Cork or Tipperary. Witness, as divisional superintendent, had refused to sign certain charges to counties for which work had not been done, and Mr. Greene signed instead. A great deal of architectural drawings were charged to the counties which were really done for Sir R. Griffith's private purposes. Knew cases in which the charges for drawing bridges had been so charged.

Mr. Ayrton—Do you mean public bridges? No; I mean drawings of bridges and buildings, &c., which were made for the private use of Sir R. Griffith. The charges for copies required by the Landed Estates Court are charged to the county, and the money is paid into the Treasury. Great dissatisfaction at one time existed as to the manner in which the work done outside the office by the assistants was distributed.

By Sir F. Heygate—There were many instances in which tenants declined to tell what rent they paid, but, on the whole, there was no disinclination to tell.

By Colonel Forde—If you want a tracing of your estate from the Valuation Office, and you pay for it, the charge is made to the county, although the fee is paid into the Treasury. This is the practice unless the tracing is given out, not to be done after hours.

Mr. Ayrton said the money was paid into the Treasury, and went against the share of the valuation expenses paid by the Treasury.

In reply to Mr. Ayrton, the witness said the "general hands" in the office were fully employed during office hours, although there were in that office persons who would *shirk their work* if they could.

To Mr. Downing—Mr. Hope was not, he believed, paid for his services by any one connected with the Exhibition. Mr. Shaw, the chief clerk, refused to give me the papers this committee desired me to produce, and he said he had received a telegram from Mr. Greene, telling him not to give them, and that he would obey Mr. Greene, and not the order of the committee. The valuation of the county of Dublin was not in his department. Had heard that Mr. Irwin had at one time been suspended in consequence of complaints from the county of Cork. Mr. Irwin had a son and a nephew in the Valuation Office.

By Mr. Ayrton—Did not Mr. Shaw say he would send the papers you asked for direct to the committee? No; he said he would send them to Mr. Greene.

Mr. Ayrton—And he was quite right.

The Chairman—I do not think he was. The witness was ordered by this committee to bring the papers, and Mr. Greene had no right to interfere in the matter.

Mr. Ayrton—I understand the papers are all in the room, but the usual course is for the head of the department to produce papers.

The papers were here put in by the solicitor to the Valuation Office, and the O'Connor Don said that many of those he desired to see were missing.

The Chairman said he had heard that they were burning papers in the office for two days after the notice to produce them had been served!!

In answer to the Chairman, witness said he would undertake to say that neither the present nor the late head of the Valuation Office *knew anything about the value of either houses or lands*. He thought there ought to be two commissioners instead of one, and that promotion in the office ought to go by merit. He thought it would be a great benefit to the service if some of the staff who had left it were to return to it. The revising at the workhouses was mere clerical work, and might be done quite as well, and at less cost, at the office in Dublin.

By Mr. McCarthy Downing—Had heard there were great complaints that some of the best of the staff had been dismissed or discontinued. Had heard that particular valuations were reduced and others raised, in order to deprive one person of a vote and give it to another. This complaint had been made as regards Sligo.

Mr. Downing—Do you know complaints were made by the late Mr. Reynolds in reference to the county of Dublin, and that complaints were made against Mr. Irwin in reference to the borough of Bandon? I have heard such complaints were made. The brother-in-law of Mr. Irwin gave the Conservative agent a letter of introduction to Mr. Perrin, who was engaged in the valuation of the borough, in order to influence him in the valuation.

Mr. Fortescue—What did Mr. Perrin do? He rejected it with indignation. Mr. Irwin's brother-in-law is Mr. Hurford, and he is also employed in the Valuation Office. He should recommend two commissioners, to be of different politics, so that one might be a check upon the other. Mr. Hurford had been in Bandon before Mr. Perrin went there.

Sir F. Heygate—Are you one of the dissatisfied persons in the office? I am not. I have no reason to be so. The dissatisfaction in the office arises from the system of promotion. I do not think there can be satis-

faction in any department where an arbitrary power of dismissal is given to one person.

Mr. Ayrton—There is always dissatisfaction in cases of promotion where there are ten candidates and only one vacancy.

To the O'Connor Don—It would be a protection to the clerks in the office if there were two commissioners instead of one.

To Mr. McCarthy Downing—The complaint in the office was not that the staff was reduced, for that might have been necessary, but that persons were removed whose services ought not to be discontinued. Alterations in the classification were made in 1864. Prior to that time the Catholics were as two to one Protestant; now the staff consists of two Protestants to one Catholic.

Mr. McCarthy Downing—That is one cause of complaint, and the sooner it comes out the better.

Witness, in reply to further questions, said he could not say that clerks were dismissed because they were Catholics, and others brought in because they were Protestants; but the private secretary of Sir R. Griffith had, no doubt, great influence in the appointments.

Mr. Ward Hunt—You are a Catholic, I presume? No; I am not.

Mr. Hunt—Then do you consider you have been unduly favoured because you are a Protestant? No; because I was appointed 19 years ago by Mr. Kelly, who was a Catholic. He appointed four divisional superintendents, three of whom were Protestants and one a Catholic. No nominations have, I believe, been made by Mr. Greene since he became Chief Commissioner.

The committee then adjourned.

FRENCH OCEANIC NAVIGATION.

Of late years the French have been making considerable efforts to dispute the commercial supremacy of the seas with England, so far as concerns the establishment and working of great lines of ocean steamers. To effect this object, two large steam shipping companies—the Transatlantic and the Messageries Impériales—have been endowed by the national treasury to an extent which would never be endured in England; but, notwithstanding this State aid, only one of the two concerns in question (the Messageries Impériales) has been enabled to present to the shareholders a liberal dividend. At the close of 1868 the Messageries Impériales had accumulated naval plant to the estimated value of £3,620,800, as compared with £3,477,417 at the close of 1867. The plant was thus increased last year to the extent of £143,382, a result which was inevitable having regard to the constant expansion of the company's operations. The steamers added to the company's already extensive fleet in 1868 were the Hooghly, the Tanais, and the Tage; the first of 500 horse-power and 4,000 tons of displacement, and the two others of 280 horse-power each and 2,700 tons of displacement. The largest of the new steamers, the Hooghly, is now employed in the company's Indo-Chinese line, while the two smaller additions to the fleet of the undertaking are engaged in the less arduous lines developed in the more tranquil Mediterranean. The company is not content with the progress which it achieved in 1868, but in the spring of this year it had still in course of construction or equipment the Scamandre, the Ebre, the Gironde, the Amazone, the Uruguay, and the Peiho. When all these vessels are ready for service the undertaking will have at its disposal sixty-five steamers, of an aggregate force of 20,885 horse-power and 187,384 tons of displacement. During the last few weeks the Scamandre and the Ebre have been brought into working in the Mediterranean. The Peiho will be employed in the Indo-China line, in order to provide for the doubling of the service in the Indo-Chinese seas, for which arrangements were made in a fresh convention concluded with the State in 1868. As regards the Gironde, the Amazone, and the Uruguay—each a great steamer of 500 horse-power and upwards of 4,000 tons of displacement—they will successively take

their places in the company's line to Brazil and La Plata before the close of the current year. The commercial relations of France with Brazil and the South American Republic have been steadily extending of late years; and under these circumstances, the directors have deemed it advisable to increase the efficiency of the Brazil line. The three new steamers which are now about to be devoted to it will be propelled with much more powerful engines, and will present much more considerable transport accommodation than those which have been running to South America since 1860.

The opening of the Suez Canal in October or November can scarcely fail to exert an important influence on the future of the company. It will enable it to carry passengers and mails even to China without transshipment; it will also relieve the concern from the necessity of maintaining a duplicate staff—or what is virtually a duplicate staff—on both sides of the Isthmus of Suez, so that the working charges will be considerably lightened. It is probable that the opening of the Suez Canal will lead to the development of other and competing steam shipping enterprises in the Indian Ocean, but still the Messageries Impériales will doubtless be able to maintain its ground. At present it is doing an increasing business in the remote seas of the East, in which the flag of France once enjoyed a greater amount of distinction and glory than it has possessed of late in that quarter of the world. Thus, while in 1865 the company's Indo-Chinese line carried 7,231 passengers and 5,463 tons of goods, the corresponding movement in 1868 was 10,623 passengers and 9,581 tons of goods. The operations of the Messageries Impériales open up a well-nigh boundless trading vista. "Ships, colonies, and commerce,"—this would seem to be, in some respects at any rate, the motto of Napoleon III. The worst of it is that the French nation generally is taxed, in the matter of French ocean steam navigation, for the benefit of a favoured few. The system is open to many grave objections; but, under the present régime, it seems likely to be persevered in. France, as exhibited through the medium of Napoleon III. and his ministers, is evidently resolved to compete with England on every sea for a share of the material wealth of the world.—*Colliery Guardian*.

SUBURBAN TOWNSHIPS.

RATHMINES AND RATHGAR.

THE annual meeting of the Commissioners of Rathmines and Rathgar was held in the Town Hall, Rathmines, on the 16th ult.

FREDERICK STOKES, Esq., J.P., presided.

There were seventeen commissioners in attendance. From a very satisfactory report read by the secretary we take a few passages:—

"After every expenditure, including the reduction of the debt by £500, a small surplus remains of the 2s. rate for the year, notwithstanding a considerable outlay for sewerage. The increase in the valuation of the present year is, as expected, greater than last, viz., £1,512 against £724, and there is every reason to hope that the amount for the next year will not be less. The cost of water has been further reduced to the township by increased sales, and the board have the pleasure to anticipate a still further reduction in consequence of a contract having been made for the supply of Portobello Barracks. As already adverted to, another £500 bond has been paid off, and the board will be prepared to extinguish the remaining £500 bond, bearing interest at 5 per cent., in the course of the summer, and then proceed, as funds permit, with the liquidation of the $\frac{4}{5}$ per cent. bonds. There are, however, still some very urgent claims for sewerage, especially in Mountpleasant-avenue, to be dealt with, whenever a surplus affords the means, the board being more than ever impressed with the paramount importance of keeping the rate fixed at 2s.—the more so, that every other township has considerably exceeded that

amount. At the annual election for commissioners the outgoing members were re-elected. On the death of Mr. Tallon, Mr. John L. Reilly, of Leinster-square, was chosen in his stead; and on the retirement of Mr. Darley, Mr. Mark C. Bentley was elected to fill the vacant seat."

The report and statement of accounts were unanimously adopted.

Mr. George Shannon, in proposing the appointment of Messrs. Matthew Morison and Robert Duggan as auditors of the accounts for the past year, said he came there on behalf of the ratepayers to express their complete satisfaction not only at the state of the affairs of the Commissioners, but at the state—sanitary and otherwise—of their rising and prosperous township. The Commissioners did not owe more than £15,000, which, considering the importance of this township, was a mere bagatelle. The statement in the report concerning the paramount importance of keeping the rate fixed at 2s., and no more, embodied to his mind the great success of the district. He warned the Commissioners concerning an observation made in the Corporation some days ago concerning their township contributing its quota to complete any arrangement for the purification of the Liffey. He would express the opinion of the ratepayers when he said that they were determined to stand by the Commissioners in their efforts to keep themselves clear of the blighting shadow which hangs over the Corporation.

On the motion of Alexander Parker, Esq., J.P., Frederick Stokes, Esq., J.P., was unanimously re-elected chairman of the Commissioners for the ensuing year.

PEMBROKE.

THE annual meeting of the Pembroke Township Commissioners was announced to be held at 12 o'clock on the 16th ult., at their office, Ball's-bridge, for the purpose of submitting a statement of accounts, &c., to the ratepayers. At the hour appointed only two commissioners (Messrs. Askins and Stanley) and about twelve of the ratepayers attended. The secretary of the commissioners was not present! Both commissioners in attendance declined to take the chair at the request of the ratepayers, on the ground that they were not in a position to explain or give any information concerning the accounts if asked, and, after a short stay, they left, expressing indignation at the treatment they had received. The ratepayers present resolved to hold a meeting, and Mr. Wilfred Haughton was requested to take the chair.

Mr. Robert Molloy proposed, and Mr. Cooke seconded, the following resolution, which was unanimously adopted:—

"That several ratepayers having attended in consequence of notice, and there being no commissioners or other authorized persons to give information to the ratepayers—Resolved, that we protest in the strongest manner against this apparent neglect, and request an early and full explanation."

The chairman entered into a lengthened statement concerning the affairs of the township, alluding particularly to the arrears alleged to be still outstanding for rates. The balance of arrears out of the Pembroke township rate alone was £2,404 out of £5,987. Therefore, two-fifths of the rate was in arrears. The water-rate was in arrear £455, and the sinking fund £145. The total amount of arrears was £3,217!!! The interest on that alone would be £144 a year, while they were paying interest already on a loan of £2,000, owing solely to the rates not being collected. The interest of this £2,000 would nearly pay the gas charges for the summer months.

On the following Wednesday the commissioners held another meeting, which was well attended. John E. V. Vernon, Esq., presided.

The chairman proceeded to explain the reason for their meeting on that day. A few days before the last meeting that was to be held he (the chairman) had to be in London before a Treasury Committee of the House

of Commons. At the same time the clerk of the commissioners was taken ill, and under the pressure of his illness he forgot, unfortunately, to issue to the commissioners the usual form of notice of the intended holding of the meeting. He (the chairman) held in his hand a certificate from Dr. Hughes stating that he had been attending Mr. Hill, the secretary, who had been very seriously ill. These facts would account for the absence of the commissioners and clerk. On the part of himself and the commissioners he had to express regret that such a thing occurred. There was another ground on which he had to express regret, and that was that statements had gone forth calculated to create unfavourable impressions concerning the township. He hoped to be able to remove those impressions, and he was sure that Mr. Haughton, the gentleman who presided at the former meeting to which he had alluded, would be the first to admit that he had been mistaken if he (the chairman) shewed that the facts that were then before him had been misunderstood. The saving effected by the non-lighting of the gas in the township during the summer months was £214. The Pembroke rate had been made like the grand jury rate, leviable in two moieties. Heretofore, before the books could be made out, and the rate for March, 1869, put in course of collection, they had reached the 1st of June, and if they took four or five months as the interval before the levying of the two moieties, it was obvious that for the second one of the year they would be brought to September as the first period at which it could be collected. In October, the collection not being satisfactory, the result was that the collector was suspended and eventually dismissed. The appointment of a successor occupied considerable time, and it would thus be understood how an apparent arrear of rates appeared in the accounts. It had been said that £3,217 of rates were uncollected and outstanding, but such was not the case. The actual amount outstanding of the rates for 1868 was £439. Certainly, on the face of the accounts for 1868 presented, Mr. Haughton's mistake was natural. The commissioners should not complain of any mistake which had occurred owing to their absence, for it was their duty to be present to explain everything which did not appear satisfactory. With respect to Mr. Haughton's statement that the commissioners were obliged to borrow £2,000 in consequence of the rates not being collected, and that the ratepayers had to pay interest on that sum, he might mention that that sum had nothing whatever to do with the collection of the rates. It was borrowed under the powers of their mortgage, not to pay a contract for water-pipe supply to the township. It had been borrowed before the second moiety of the rate had been put in course of collection; and if Mr. Haughton would look to the accounts he would find that £2,300 had been paid to the contractor as a full discharge of the debt. The £1,200 advanced by the guardians of Lord Pembroke bore no interest, and it was therefore no injury to any ratepayer to withhold from repaying it. Every charge affecting the revenue of 1868 had been repaid, and they had actually invested £544 in the new 3 per cent. stocks as sinking stock to repay the capital sum of £14,000 borrowed.

Mr. Wilfred Haughton said that perhaps he was bound to make some explanations, as he had occupied the chair at the previous meeting. He now wished to express his satisfaction with the chairman's explanation, and wished to exonerate himself from the appearance of imputing anything against the commissioners. The statements he had made on the previous day were founded on the only information then available.

On the motion of Mr. Molloy, seconded by Mr. Brunker, it was unanimously resolved—"That the explanation given by the chairman as to the state of the accounts and the gas of the township, and the absence of himself, the other commissioners, and the secretary at the previous meeting, was deemed full and satisfactory."

Some conversation with regard to the lighting of the township ensued, and resulted in the adoption of the following resolution:—

Proposed by Mr. Haughton, and seconded by Mr. G. Read—"That in the opinion of this meeting the saving from the extinguishing of the public lights during the summer quarter is unworthy of this township, and we hereby request the commissioners to take immediate steps to have the gas lamps lighted during the dark hours of the night."

NEW CHAPEL AND CHOIR, CONVENT OF URSULINES, DONERAILE, CO. CORK.

Our lithographic illustration with this issue is a south-east view of a new chapel, choir, &c., which is being built at the Convent of Ursulines, Doneraile.

The dimensions of the chapel internally are as follows:—Length, 50 feet; width, 22 feet; height to ridge, about 36 feet. The choir is 18 feet wide and 32 feet long, and communicates with the sanctuary by one large arch filled in with wrought-iron grating. The principal entrance is situated in the west end. The entrance from convent is by a new door opened into choir from old convent building.

Over the west entrance is an organ gallery, access to which is obtained by a staircase turret at south-west angle of building; a cloister running the south side of chapel from choir to this staircase affords the religious means of communication with the organ gallery without being necessitated to go through the chapel.

The roof of chapel is open timbered, stained and varnished, &c. The sacristy, situated at north-east corner, as seen by view, is 14 feet by 12 feet.

The architect, from whose design the work is being done, is Mr. George C. Ashlin; the builder is Mr. Newstead. The cost will be about £1,500, including altar.

MECHANICAL ARTS.

CHIPPING AND FILING.

CHIPPING consists in the cutting of a thin stratum off a piece of iron or other metal by means of a steel chisel driven with a hammer. The process of chipping is principally applied to cast iron, the dark rind or outer crust of which, taken as it comes from the mould, is so hard as to prove very destructive to the files used on it. This hard crust does not extend beyond the one-twentieth of an inch in depth, so that when castings have to be filed and finished on the surface, it is removed by chipping, thus leaving bare the interior and softer part of the casting for the file to act on. The greater part of the work which used formerly to be done by chipping is now done by the planing machine.

The chipping chisel is generally made out of an octagon bar of cast steel; it is about 7 inches long and $\frac{3}{4}$ -inch diameter, flattened out and tempered at one end, and then ground to an edge by being bevelled from both sides, so as to form an angle of about 60 degrees. The hammer used in chipping weighs from two to three pounds, and is held in the right hand near the tip of the handle; the chisel is held in the left hand, and as the blows require to be struck with considerable force and rapidity, there is some danger of the hand being injured through the hammer missing the chisel. It may be noticed that the nearer the chisel is held to the end the less danger there is of striking the hand, for as the hammer can be easily directed to the centre of the hand, the

nearer the end of the chisel is to this centre the less care will be required in holding the chisel; whereas when the chisel is grasped near the centre, and protrudes much beyond the hand, it requires great care to keep it in the direction taken by the hammer; for should the chisel not be held in this direction it is likely to be struck on the side, and thus to throw the hammer on the hand. This will be understood by the annexed figures:—

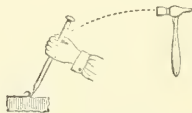


Fig. 1.

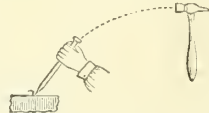


Fig. 2.

Where fig. 1 shews the chisel grasped near the centre, and that though the hammer is directed to the centre of the hand, yet that owing to the chisel not being held in the right direction, the hand is sure to be injured; whereas in fig. 2, no matter in what direction the chisel may be held, the hand is safe. The chisel is generally held at an elevation of about 45 degrees with the surface chipped. The thickness of the stratum removed is regulated by the degree of elevation of the chisel.

Filing consists in the paring off of very small shavings of metal by means of the numerous cutting edges or teeth of the file. It need scarcely be observed that the coarser the teeth the larger will be the shavings removed, and that with sufficient force the quicker will the work be accomplished; hence it is customary to use coarse files for the greater part of the work, but as coarse files make deep scratches, the work is finished with smooth files. The file is considered one of the most difficult tools to use with accuracy; this, perhaps, is owing to the want of a sufficient guide by which to regulate the direction of the file, the direction of the file depending nearly altogether on the hand for guidance.

In filing a flat surface on a piece of iron, such as that represented in section in fig. 3,

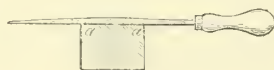


Fig. 3.

unless there is some skill or care used in the operation the two corners, *a* and *a*, are apt to be greatly pared away, and that part of the surface about midway between *a* and *a* will be least worn down. It will be seen that the two points, *a* and *a*, are supported with the metal at only one side, whereas any other point on the surface between these two is supported with metal at both sides; then, as the file is drawn backward and forward nearly its whole length, it is apt to hang over these corners and so file them off. The work is held in a bench vice, in such a position as that the file will run in a horizontal direction nearly level with the workman's elbow; but should the work be of a very light nature, it may be held in a more elevated position; or if it be very heavy, it may be held a little lower.

In filing flat surfaces, a "surface-plate" is used to enable the operator to finish the work with accuracy. The surface-plate is merely a cast-iron plate planed and carefully reduced to a true surface. Some red lead is rubbed on this plate before being used; the piece of work is then rubbed on the plate, and wherever the plate has reddened the work it shews that that part of the work is above the level, and has to be filed down; and this

process of testing and filing is carried on until the work is reduced to a perfectly true surface. It saves the file to draw it back at each stroke as lightly as possible. There is also economy in using the files first on brass or cast-iron, and afterwards on wrought-iron.

THE LIFFEY NUISANCE.

SUMMER again! and still the "sweet waters" of Anna Liffey flow on between their granite boundaries, dispensing around their malaria-laden vapours. We in this part of the United Kingdom have been favored so far with only a moderate share of the sun's heat, and to this may, no doubt, be attributed the comparative freedom of our city from fever, &c., at this season of the year.

On Thursday last the Corporation took the matter of the "purification of the Liffey" into consideration, and "ordered and instructed" "John Smyth, Esq.," to take all necessary steps for the accomplishment of this much-desired object.

In reference to the proposal that outlying districts whose sewage it is considered helps to contaminate the Liffey, and on whose rate-payers a portion of the expense of cleansing should fall, the following letter from the commissioners of the well-managed and flourishing townships of Rathmines and Rathgar, was read:—

"My Lord,—I am directed by the Rathmines and Rathgar Commissioners to express the regret with which they have read the late debate in the Corporation on the improvement of the Liffey, and the resolution come to by that body, without any intimation or conference with independent municipalities (not very courteously termed 'outlying townships'), to seize upon a portion of their revenues for the Liffey purification, and enter upon a Parliamentary contest for that purpose.

"This Board have, they think, great cause to complain of the manner in which the subject has been dealt with by the Corporation as a body, but they have an undoubted right to expect that the reasons for the proposed attack should be founded in fact. They observe, however, that it is stated, 'That the chief sewage of the townships passes through the city sewer.' As regards this township and, they believe, others, this is very inaccurate. Their entire sewage, with the trifling exception of a small ancient drain at Harold's Cross, is discharged at a point beyond the city boundary, and never enters the city at any point.

"Should it prove that there is any just complaint in reference to the sewage of the townships of Rathmines and Rathgar, the Board will meet it fairly, and, either alone or in conjunction with other townships, remove the cause. But they take this early opportunity of apprising the Corporation, through your lordship, that they will resist by every means in their power being made parties or contributors to any plan in conjunction with the Corporation, as they consider it preferable to undertake any needful works, however costly, themselves, to uniting in an undertaking which, judging from the waterworks, may probably far exceed the highest estimate, though that has risen from £30,614, the sum proposed in 1853, to £200,000, at present.

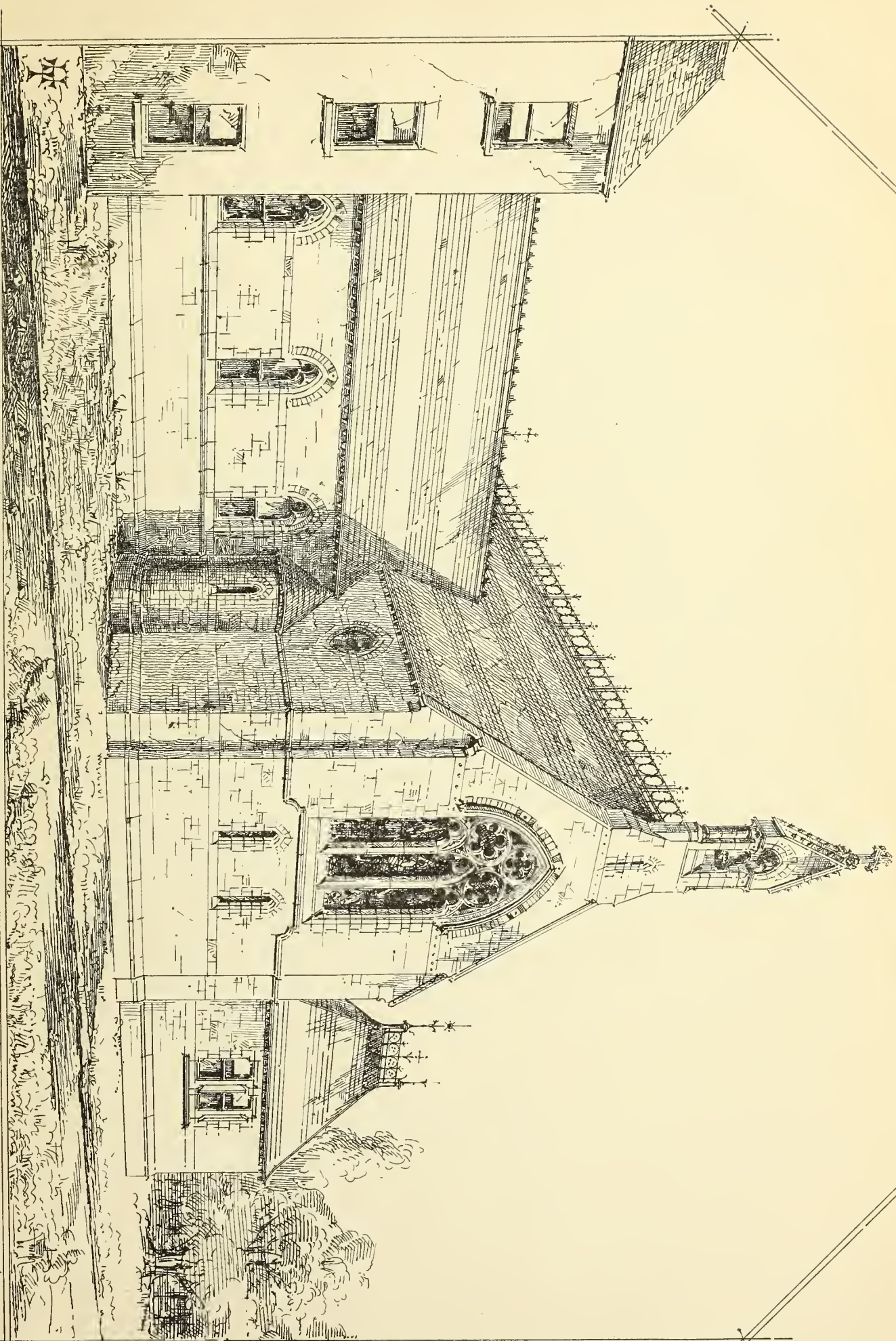
"In using this decided language the Board disclaim, both individually and collectively, any unfriendly feeling towards the Corporation, or any desire to impede them in dealing with an admitted evil; but they will firmly resist any aggression, which they regret should be sought to be justified by such statements as they are forced to notice.

"JOHN H. EVANS, Sec."

Mr. Byrne said that the Council wished to remove the nuisance without their coming into collision with any other body. The entire sewage of Rathmines was discharged into the River Dodder, a few yards from the London-bridge-road, and was brought completely up the River Liffey by the incoming tide.

A letter from a Mr. Malcolm was read, in which he informed the Council that he had a simple plan (!), by the adoption of which all cause of complaint in respect to the Liffey would be removed. He proposed to carry out the plan for £300 or £400, with a fee of 100 guineas if it succeeded, and no fee if it failed!!

A letter was also read from a Mr. T. D. McCarthy, in which he stated that the plan adopted by the Council, and said to have been prepared by Mr. Edwards, for the utilization



SOUTH-EAST VIEW OF NEW CHAPEL & CHOIR OF BONMAHON CONVENT, CORK.

of the sewage, was not the plan of Mr. Edwards, but in reality *an idea of his!!!*

Both letters were referred to No. 1 Committee.

Mr. Byrne moved the following resolution, which was passed by a majority of 5:—

"Whereas it is desirable and necessary for the health and convenience of the inhabitants of the city of Dublin and its vicinity, and imperative for the effective drainage of the low-lying districts thereof, that the system of intercepting sewers, according to the plans of Messrs. Neville and Bazalgette, should be constructed and carried into operation; and whereas some of the matters connected therewith, as also some of the works necessary therefor, cannot be undertaken without the authority of Parliament: It is hereby resolved, that the law agent of this Corporation, John Smyth, Esq., be hereby ordered and instructed to take all necessary steps on behalf of this Council for the promotion of a bill in the next session of Parliament, to enable the Corporation to execute and carry said works into operation, and to sell, dispose of, or, at their option, utilize the sewage; and that the draft of said bill be laid before this Council not later than the 1st of August, 1869, as directed by former order; and that the Town Clerk do affix his name to whatever advertisements or notices may be necessary in relation to this order."

Previous to the putting of above resolution, an amendment (afterwards withdrawn) was proposed by Mr. McGrath to the effect "that the same course be adopted as was agreed to by the house before, referring all the plans which have already been brought before the Council to a committee of engineers, to be selected by the Council."

Another amendment, by Alderman P. P. McSwiney, was declared lost by a majority of 5—"That the consideration of the question be postponed till it shall have been ascertained from what source the interest on the money to be expended on the purification of the Liffey is to come, and what security we are to give the Government for the loan required; and that a committee of the whole house be requested to report on the subject."

BUILDING CONTRACTS.*

THE difficulty of the English law at the present time, whether caused by the complex relations of modern society or by the way in which the law is created and promulgated, or whether it is owing to a combination of both causes, has undeniably this amongst other results, that it is next to impossible for anyone to understand the legal effect of his contracts or his other acts, unless he has given a considerable amount of attention to the study of the law. To give such attention requires, however, much more leisure than can usually be afforded by those who are not connected with the law as a profession, and most people are in consequence in a state of entire ignorance of the most elementary principles of the law to which they are subject, and which dictates their various rights and duties. One of the forms in which this ignorance shows itself is extreme carelessness in entering into contracts even when of the most important nature. Few persons pay any attention to the wording of the writings which they sign, and are often afterwards much surprised at the legal construction that is put upon expressions and sentences which they hardly noticed when they entered into the contract. The experience acquired by one individual in the course of a legal proceeding is seldom appreciated by others who are not directly interested in the question then at issue, and hence it is that documents are every day executed by people who are quite ignorant of their real effect, and who would be horrified if they knew the meaning which the law attaches to the engagements into which they so readily enter.

In former days the evil of reckless contracts was thought so great that the law sometimes gave relief simply on the ground of the hardship imposed on one of the parties. Bonds to secure the payment of money are the most familiar instances of this. By the plain construction of a bond in the usual form, if the obligor did not actually pay the money mentioned in the condition on the appointed day,

he became liable to pay the larger amount mentioned in the obligatory part of the bond.

The Court of Chancery at a very early period interfered to prevent the obligor from suffering this hardship, and the obligee was compelled to be satisfied with the amount of the debt and interest and damages for the delay in the payment. Later still a statute of Anne gave the obligor similar relief at law. The same principle has been extended to other cases where a person contracts to pay a penalty (except where it is by way of liquidated damages) on the non-performance of a contract.

The tendency of the Courts at the present day is, however, to allow persons to contract as they like, whether the contracts are foolish or not. The old authorities relating to penalties are still followed, but the Courts decline to extend their principle any further. The mere fact of hardship imposed upon one of the parties to a contract is no ground for relief at law or in equity unless the circumstances come directly within the authority of cases already decided.

There is, perhaps, no class of contracts in which greater recklessness of consequence is shown than in building contracts. When the owner of land wants to build upon it he generally chooses an architect in whom he has confidence, and then advertises for tenders for the buildings, and having chosen a contractor to do the work, he confides the superintendence of the erection of the buildings to the architect. One of the commonest terms in building contracts is, that the work is to be paid for by instalments, as it progresses, on the architect giving certificates from time to time that the work is properly done. It is also generally stipulated expressly that no money is to be paid either during the construction or on the completion of the building, unless the builder obtains from the architect a certificate that the building is being built or is completed, as the case may be, to his satisfaction.

Such a stipulation as this practically leaves the builder entirely at the mercy of the architect, who is thus placed in the position of an arbitrator between the landowner and the builder. The effect of these stipulations in building contracts has more than once come before the courts. In *Clarke v. Watson* (13 W.R. 345) the action was by a contractor against a landowner for payment for work done under a building contract, which required (in the usual form) that the plaintiff should not be paid until the defendant's architect had given a certificate that the work was properly completed. The declaration averred that the architect withheld his certificate *improperly*, and claimed payment as if the certificate had been given. The court held on demurrer that the declaration was bad, and that the improper refusal of the architect to give the certificate did not dispense with the performance by the plaintiff of the condition that he should get the certificate which was precedent to his right of action against the defendant.

This latter point arose in the case of *Davis v. Taylor*, in the Court of Exchequer, last week. The action was by a builder, under a building contract in the ordinary form, against the architect. The declaration alleged that the defendant knew that the plaintiff had properly completed the work, and that without reasonable cause, and fraudulently and maliciously, and to injure the plaintiff, he withheld his certificate, whereby the plaintiff was unable to obtain payment from the landowner. There was a demurrer to the declaration, and the court have reserved their judgment. *Clarke v. Watson* shows that if the architect, in such cases as these, chooses to withhold his certificate, however improperly, the builder is entirely without remedy against the landowner, as he has not got the certificate, and it has hitherto been the general opinion that no action could be maintained by the builder against the architect, who is under no duty towards the builder either by contract or otherwise.

It would seem, from a *dictum* of Willes, J., in *Clarke v. Watson*, that if the architect re-

fused to exercise his judgment, and declined to consider the matter at all, the proper course for the builder would be to call upon the landowner to appoint some other architect to act in the matter. If the landowner refused to do so, it is possible that the builder might have a remedy, as the landowner might then be considered as being in the position of a person who had never appointed an architect, and had thereby *himself* rendered the performance of the condition precedent impossible. If the landowner by any act of his own prevents the builder from getting the certificate, the absence of the certificate cannot be raised by the landowner as a defence to an action by the builder. It has been decided (*Batterbury v. Vyse*, 11 W.R. 891) that if the architect refuses to give the certificate in collusion with the landowner, the builder is relieved from the necessity of obtaining it, and can maintain an action for payment without the certificate.

It does not often happen, however, that an architect refuses to come to an opinion on the subject of the works under his charge, or that a landowner can be proved to have caused his architect to refuse a certificate, or that it can be shown that an architect has acted maliciously in refusing a certificate. The ordinary case is (and it is one that frequently happens) that the architect, whether rightly or wrongly, has himself formed an opinion that the works are not properly done. The correctness of this opinion cannot in these cases be subjected to any test, as the builder has beforehand engaged that his payment shall depend upon the contingency of getting the certificate.

So far we have only dealt with the builder's rights at law, but in equity he is in no better position. In *Bliss v. Smith* (34 Beav. 508) it was held that a builder had no remedy against a landowner whose architect refused to give a certificate, unless there was either fraud or the accounts were too complicated to be taken at law. Practically, the builder's position is the same in equity as at law. The builder under an ordinary building contract is therefore entirely at the mercy of the architect, who is a judge from whose decision there is no appeal.

The chief objection to such a state of things depends not so much upon the fact that the builder must submit to the decision of the architect, because that is nothing more than is voluntarily accepted by every litigant who consents to an arbitration. The real hardship is that the arbitrator is the architect who is employed and paid solely by the landowner, and thus there may be a direct clash between the claims of the builder and the interests of the architect's employer. The architect is thus placed in a position which no one should occupy. It resembles somewhat the case of a man who is judge in his own case. Such a position renders it possible for an unscrupulous architect to do great injustice, and at the same time makes it difficult for one who is scrupulous to do his employer justice, and it ought, therefore, to be avoided. We do not for a moment mean to say that architects placed in this position do not generally do their duty, and do it well. On the contrary, we believe that in the majority of cases they strive to do justice to both parties; but notwithstanding this, they are necessarily open to suspicion on account of their position, which in itself is far more difficult than that of an ordinary arbitrator, who is equally independent of both parties.

The simplest remedy for this evil would be to appoint some independent person who should, in case of dispute, be the ultimate arbitrator between the builder and the landowner. It would be easy to adopt a form of contract which should contain such a provision, and if builders were once thoroughly aware of the legal construction of their ordinary contracts it is probable that they would, in their own defence, insist upon the insertion of some such provision as we have suggested. In the mean time some good may be done by pointing out the objections that there are to the common form of building contracts which is now generally in use.

* From the *Solicitors' Journal*.

L A W.

COURT OF COMMON PLEAS—JUNE 17.

(Before Chief Justice Monahan and a Special Jury.)

Gribbon v. Moore.—This was an action by Mr. Edward P. Gribbon, architect and surveyor, of Stephen's-green, against Mr. Hugh Moore, druggist, of Capel-street, to recover the sum of £128 14s., being his fees for "taking out the quantities" for a warehouse proposed to be built on the site of the old Scots' Church, Mary's-abbey, according to drawings and specification prepared by Mr. William Fogerty, architect, but which defendant, after getting the tenders, had abandoned the idea of building. The defence was that no work was done, and that defendant had never employed Mr. Gribbon. Messrs. Heron, Q.C., Falkiner, Q.C., and Boyd, LL.D., instructed by Messrs. Anderson and Lee, solicitors, appeared for the plaintiff. Messrs. Macdonogh, Q.C., Butt, Q.C., and Foley, instructed by Mr. H. L. Keily, for the defendant.

Mr. Heron stated the plaintiff's case. His client was a well-known surveyor of large experience, holding the important post of surveyor to the War Department in Ireland. His business was to prepare bills of quantities from the drawings and specifications of architects, on which the builders made their tenders. It would be proved to the jury that the usage was, when tenders for a building were required that the architect employed a surveyor to make out these quantities, who furnished each builder with a copy, and the fees of the surveyor were paid by whatever builder got the work; of course the builder duly provided for these fees in the estimate, it usually forming the last item, and being at the rate of 1½ per cent. on the gross amount. If, however, by any chance the work did not go on, and no builder was employed, then according both to law and custom the employer became directly liable to the surveyor for his fees. In any case it was the employer's money paid the surveyor; but if the work went on, the latter received it through the builder, if not directly from the employer. This question, he should inform them, under the direction of his lordship, had already been decided in an important and almost exactly parallel case, viz., *Moon against the Guardians of the Witney Union*, 3 Bing. N.C. 814. The plaintiff in that case was also a building surveyor, and had prepared quantities for a building by directions of the architect, which building was afterwards abandoned. He was to have received his fees, as in the present case, from the builder who got the work; but as the guardians did not go on with the building, it was held that, as they had by their own acts rendered it impossible for the plaintiff to obtain his fees from the builder, they were liable to him for the amount of them. The present case was almost exactly similar: Mr. Moore being desirous of erecting extensive warehouses, had in the beginning of the year 1867 employed Mr. Fogerty, the well-known architect, of Harcourt-street, to prepare drawings and specifications, which were formerly approved by the defendant on the 9th February in that year. It was then settled that the plaintiff should prepare the quantities, and that ten of the leading builders of Dublin should be invited to tender on them, the tenders to be in by the 15th March. The "conditions of contract," "conditions of tender," circular to builders, and form of tender, were all duly drawn up by the architect, and examined and approved, not only by Mr. Moore, but also by his solicitor, early in February. The "conditions of tender" contained this important clause, viz.:—"1. The quantities will be taken out by Mr. Gribbon, and a copy furnished free to each party desirous of tendering, on application. The surveyor's charges for the quantities to be paid by the party whose tender may be accepted on the receipt of the first instalment on account of the work, at the usual rate, as will be set forth at foot of the estimate." Dated Feb. 11, 1867. Signed, Wm. Fogerty, architect. He would direct the particular

attention of the jury to the fact that, while it was undoubtedly the successful builder that was to pay the surveyor, it was to be out of the first instalment, which was of course the employer's money, and the item was very properly to be provided for by the builder at the foot of the estimate. The time for getting in the tenders was very short, and his client had to work extra hours, and lay aside other important business to attend to this, but was fully up to time, and furnished the several builders with the quantities, so that all their tenders were delivered to the architect at the date fixed, the 15th March. The tenders ranged from £9,000 to £7,500, or thereabouts; or after allowing for £500 worth of old materials, showed £8,000 to be the lowest value to be put on the work. At the foot of all the builders' estimates the item of "surveyor's fees, 1½ per cent.," was added, being included in the amount of the tender. The lowest tender was that of the old-established and respectable firm of Daniel Crowe and Sons, the only surviving member then being the late Mr. William Crowe, who was then also in an infirm state of health, the business, however, being carried on by his sons and their able manager, Mr. Samuel Robinson. These prepared the estimate and tender; and, had the work proceeded, would have carried it on, as they have done many other important works before and since. Some conferences ensued between the defendant, the architect, and Messrs. Crowe, with reference to some proposed reductions, in order to determine which the detailed estimate made out on the plaintiff's quantities was produced and used. Some comparatively trifling reductions were made, and at length a deed of contract was prepared by Mr. Moore's solicitor (Mr. Keily), submitted to Messrs. Crowe's solicitors (Messrs. Meade and Colles), and approved, and everything appeared in fair train for proceeding with the work, when it was found that Mr. Crowe, sen., was in too infirm a state of health to execute the contract, and some delay took place. Eventually, Messrs. Crowe, jun., offered to carry on the work, giving the names of three first-rate merchants of the city of Dublin as securities. This, however, defendant did not choose to accept, and soon after, without informing either the architect, the surveyor, or the builders, changed his mind, and advertised the site for sale. It would be proved that none of the work had been carried out; and as the surveyor had no builder to pay him in the ordinary way, and as provided for by the "conditions of tender," he looked to the defendant to pay him, as having first employed him through his architect, and as being the only party who received any benefit. It would also be proved that defendant fully understood and approved of the plaintiff's being employed on the usual terms, and he (counsel) therefore looked with confidence for a verdict in favor of his client, which would simply give honest payment for honest work.

Mr. W. Fogerty, architect, examined by Dr. Boyd—Was employed by Messrs. Moore and Co. in the beginning of the year 1867 to prepare plans, &c., for an extensive set of warehouses to be built in Capel-street. Completed the plans on the 9th February, when they and the conditions of contract and tender were examined, and approved at a meeting of Mr. Moore, his partners, and his solicitor, held at Rathgar same evening. It was then settled that Mr. Gribbon should prepare the quantities, and tenders be in by 15th March. Ten of the leading builders in town were invited to tender, as per lithographed circular (produced). This circular referred to the conditions of contract and tender, containing the clause relative to the surveyor's employment. On the 15th February, just as he was sending the drawings, &c., to Mr. Gribbon, Mr. Moore called; he asked "what the surveyor's charges would be, as he supposed they would have to come out of his pocket?" Told him, "certainly, the usual rate, 1½ per cent." Mr. Moore requested him to send copies of the conditions of contract and tender which were being lithographed by the sur-

veyor to his solicitor. Did so next day, with a letter (produced). The solicitor acknowledged them, asking for another copy. The ten builders sent in their tenders exactly at the time fixed. Mr. Gribbon was told he should be up to time, and was. The lowest tender was Messrs. Crowe and Sons', net £7,337 after giving credit for old materials—gross amount about £8,000. They were invited to a conference at my office relative to some reductions. I prepared with Mr. Robinson an estimate of these—amount £260—from their detailed estimate based on Mr. Gribbon's quantities. While this was doing, Mr. Moore wanted to see Messrs. Crowe's estimate, but told him I could not give it him without their permission. It is not usual at that stage of a business to allow a builder's estimate to be overhauled, as it contains their "trade secrets" in the way of prices. Told Mr. Moore, however, that he could have as many copies of Mr. Gribbon's blank bill of quantities as he liked, and soon after obtained Messrs. Crowe's permission to show him their estimate, as he wished for it. It was then settled to make but one small reduction of £60, and that a deed of contract, already prepared, would be sent for approval of Messrs. Crowe's solicitors. Soon after Mr. Moore called, complaining that there was an item at the foot of estimate for "surveyor's fees 1½ per cent." Told him this was quite right in accordance with the clause in the conditions of tender; and that as the builder had to pay it, he should provide for it. He said, "Then it is with my money he pays for it." Told him, "Exactly; and it is with your money he will pay for the bricks, timber, slates, and everything connected with the building; but you have not to pay it in addition to the contract sum, as it is included in the amount of the tender." Mr. Moore quite comprehended this, and soon after heard that a day was fixed for signing the contract. Had all the plans, &c., ready for the purpose, when he heard that a difficulty had arisen in consequence of Mr. Crowe's illness. In the month of May saw an advertisement offering the place for sale. Wrote to Mr. McNeight, the junior partner, asking him to call. He did so, but could give me no positive information. He said Mr. Moore of course meant to pay fairly for all that had been done. Wrote directly to Mr. Moore next day, but got no answer. Mr. Keily called to know what my charges would be. Told him I would send in my account, and the surveyor's, shortly. Called on Mr. Gribbon for his account and sent it in with my own soon after. The amount is correct—1½ per cent. on £8,000, besides lithography. It is the usage when work is abandoned for the surveyor to be paid directly by the employer. Never knew it to be refused before, and has known numerous instances of its being paid.

The Chief Justice—Really, Mr. Macdonogh, can you have any defence to this? We had a case—*Taylor v. Hall*—so like this before that it seems useless to waste further time on it. The only doubt then was, whether the employer or the builder was the party liable, as some work had been done; but here there can be no doubt on that subject. The custom of the trade was then proved by half-a-dozen witnesses. You would be better employed in another court.

Several jnrors also said it was really only wasting time to continue the trial.

Mr. Macdonogh here conferred with defendant, and announced that his client pressed him to go on, as he had never seen the plaintiff or authorised his employment, and conceived he had a good defence to the action. Defendant addressed the court to same effect.

The Chief Justice said that of course he would try the case out, if the parties were determined on it.

Mr. Fogerty, cross-examined by Mr. Macdonogh—Had to bring an action against Mr. Moore for his own fees; a considerable part was lodged, and proceeded for the balance. Was taken ill during the trial, which was a pre-tracted one, and the jury disagreed; it is not settled yet. Mr. Gribbon was a witness on his side. When Mr. Moore called some time after the 20th March to object to the item at

foot of the estimate for surveyor's fees, told him it was simply what was settled in the "conditions of tender," dated February 11th. Could give most of the dates accurately from his diary. Considered he was quite right in refusing to show the builder's estimate without his consent. It was not at all like "buying a pig in a bag," as the tenders were to be in lump sums in competition, and the builders were just as likely to make a mistake in detail against themselves as against the employer. The detailed estimate was to be kept by the architect as a schedule of prices for extras and omissions; this was all set forth in the "conditions of contract." There was no secret conclave for settling these things, but there was a society incorporated by Act of Parliament, called the Institute of British Architects, of which he was a member. The rules forbade the architect to receive any part of his remuneration from the builder, it being inconsistent with his position as a check over the latter; he was always paid directly by the employer. The surveyor, however, was differently circumstanced; he usually got his money from the builder, who, however, charged it to the employer. Builders now seldom take out their own quantities; certainly not for a job of this extent. It would be impossible to get tenders for such a job without the intervention of a surveyor, especially in the short time in which they were required.

Mr. Edward P. Gribbon examined by Dr. Boyd—Is an architect and surveyor of many years' experience; for some years past has practised exclusively in the latter capacity; is surveyor to the War Office. Was employed by Mr. Fogerty in the month of February, 1867, to take out the quantities for Messrs. Moore and Co.'s proposed warehouses; lithographed the several conditions first; the terms were to be the usual ones, $1\frac{1}{2}$ per cent., as stated in the conditions; this job not being all new work, it might reasonably be a higher rate—2 per cent.,—alterations involving much more trouble; had to work his staff over hours to complete the quantities in time; the item " $1\frac{1}{2}$ per cent. for surveyor's fees" was put in as usual at foot of the estimate; is generally paid by the builder who gets the work, but has also been paid by the employer directly; in case of abandoned work, is paid by the employer; has been paid during the last few years over £1,200 of fees on works which did not go on; has had nearly twenty cases of the kind. Mr. Fogerty called on him for his account in June; sent it in then, and subsequently, when he called on Mr. Moore for the amount, was told by the latter that he (Mr. Moore) was "very glad to recognize him as a friend, but not as a creditor" (laughter); was referred by him to Mr. Keily, his solicitor.

Mr. S. Robinson, late manager to Messrs. Crowe, proved the receipt of the quantities from Mr. Gribbon and tender based on them, also the conferences relative to the reductions. When old Mr. Crowe was found to be too ill to sign the contract, he and the young Messrs. Crowe offered to carry on the work at the same figure, with Messrs. John Sibthorpe, Thomas Henry Carroll, and Harman as securities. Mr. Moore gave them no answer. Would have paid Mr. Gribbon if the work went on, but would think it very strange if they (the Messrs. Crowe) had to pay him now.

Mr. John Nolan, builder, proved the usage same as previous witness. When the builders make out their own quantities they always charge for it against the employer. The surveyor was generally appointed by the architect, but sometimes the builders elect one; in all cases they charge his fees at the foot of the estimate.

Mr. Joseph Fogerty—Is an architect and engineer practising in London; is aware of the practice both in England and Ireland; it is the same. Has had a recent case in which work was abandoned through disagreement with the builder; the employer in that case paid the surveyor. The builder is only liable when he actually gets the work.

Mr. J. Rawson Carroll, architect, and Mr.

Thomas Taylor, surveyor, also proved the usage same as the previous witnesses.

This closed plaintiff's case.

Mr. Macdonogh stated the defendant's case. It was wonderful what a lot of expenses any man going to build had to incur under all these new inventions. First he had the architect, then the builder, then the clerk of works, and now he had a surveyor also. It was enough to deter any one from building. For his part he meant never to indulge in such an expensive luxury. Whatever they might do in that wealthy country across the water could be no guide for them in this poor country. As he was instructed, his client did not wish any surveyor to be employed, and only consented to it on its being represented to him that he was to have nothing to say to him—he was to be paid by the builders. Mr. Fogerty, the architect, had no right to employ him, or to pledge Messrs. Moore and Co.'s credit to him; and he would prove that gentleman to be inaccurate in some of his statements, in which his recollection differed materially from that of the defendant, who would be supported by several witnesses. The documents also clearly specified that the surveyor was to be paid by the builder whose tender was accepted. Mr. Moore had accepted a tender, and would have gone on with the work but for Mr. Crowe's illness, so that the interruption of the work was the act of God, and therefore his client was not liable. In the documents there was no such thing mentioned as Mr. Moore having to pay the surveyor for this part of the work, though there was a provision for his fees being paid half by the builder and half by the employer in the case of extra work. It was also stated that the employer would not be responsible for any errors in the quantities, shewing clearly that the surveyor could not be their agent, as otherwise they would be responsible. Mr. Gribbon having lithographed all these documents must have known what was in them, and that he was incurring risk in doing the work on such terms.

The Chief Justice—That was the defence set up in the case of Moon against the Guardians of Witney Union, which is undoubtedly the ruling case on the subject. It was there submitted that the plaintiff's employment was purely speculative, and depended on the chance of some builder getting the work; but this was ruled against, on the principle that as the defendants, by their own acts, had rendered it impossible for the plaintiff to recover his fees from the builder in the usual way, they were liable to him.

Mr. Macdonogh—Yes my lord, but my client did accept a tender, and therefore he cannot be held liable on that ground.

The Chief Justice—Ah, yes, but the conditions of tender which specify that the surveyor's charges were to be paid on the receipt of the first instalment on account of the work, clearly imply that it was not merely on the approval or acceptance of a tender, but on the completion of a contract and actual commencement of the work that the builder was to become liable. We have it in evidence that the contract was never perfected.

Mr. Moore was then examined—Had called on Mr. Fogerty in December, 1866, and then told him he would have nothing to say to the surveyor; only meant to spend £3,000, but the estimates went up to £13,000; considered the builders should have made their own estimates; was told by Mr. Fogerty that he was not to pay the surveyor in any case; he was to have nothing at all to say to him; the builder was to pay him; was ready at one time to go on with the work, but Mr. Crowe's solicitors wrote, saying that in consequence of his illness he could not sign the contract; when Mr. Gribbon came to him repudiated his account altogether; would not recognize him in any way as a creditor.

Cross-examined by Mr. Falkiner—Abandoned the work because he had quite enough of Mr. Fogerty; believed this action was his; Gribbon and Fogerty were all one; Mr. Gribbon ought to be paid by somebody; thinks Fogerty should pay him, as he had got over £200 of his (Mr. Moore's) money in his pocket.

Mr. Falkiner—Did he do no work for that? I got nothing for it; he ought to have got nothing; he should pay Gribbon, and it would be a lesson to him; had read the conditions of tender with his solicitor.

Mr. McNeight and Mr. Keily, solicitor, were called to corroborate the last witness as against the evidence given by the architect.

Mr. Fogerty was then re-examined, and explained that what he stated to Mr. Moore was, that once the contract was taken he would have nothing to say to the surveyor, as the builder would then pay him, that being the usual arrangement. He read extracts from his diary and the conditions of tender agreeing with this; neither Mr. McNeight nor Mr. Keily were present on the occasion; all the arrangements were made in view of the work proceeding; the abandonment was never contemplated at the time.

Mr. Butt addressed the jury for the defendant. He would not for a moment suppose that Mr. Fogerty would give false evidence, but submitted that his recollection disagreed with that of several witnesses, and that they were therefore more entitled to credit; if so, his client had made a special contract that the surveyor was not to charge unless the work went on, in which case he was to be paid by the builder. The documents all pointed to this. Moreover, his client had accepted a tender, and in consequence of the builder's illness it came to nothing; and, accordingly, the builder or his representatives were the parties properly liable.

Dr. Boyd replied for the plaintiff. He would call on the jury with confidence to believe the evidence given by Mr. Fogerty, the architect whom Messrs. Moore and Co. had carefully selected for this large job, and to whom they had properly left all the arrangements relative to quantities and tenders. He had done everything openly and above board. As to his having exceeded his instructions, and ran the cost up to £13,000 instead of £3,000, as stated by Mr. Moore, that was simply absurd in the face of Messrs. Crowe's tender of £7,337; and the best proof of the correctness of his plans and estimates was that Messrs. Moore and Co. almost immediately accepted a tender at that amount, which it is not likely they would do if their limit had been anything like £3,000. His story was clear and consistent; accurately corroborated by his diary and by the several documents, which proved beyond a doubt that Mr. Gribbon was employed with the full knowledge and consent of Messrs. Moore and Co., and on the usual terms. The version of the transaction given by defendant was simply incredible, as it meant that Mr. Gribbon, a respectable professional man, was to do this large amount of work and be paid by nobody, or his remuneration to depend on the caprice of Mr. Moore. Had Mr. Moore wished to carry out the job, he had a *bona fide* offer from Messrs. Crowe, jun., to carry it out for the sum he agreed to, and if that had not satisfied him he had Mr. Meade's tender, the next in amount, to fall back upon. He had abandoned the work solely from his own whim, and therefore should pay fairly for all the work done by his authority in reference to it.

The Chief Justice briefly charged the jury. The evidence was, to some extent, contradictory; the defendant asserting that under no circumstances he was to pay the plaintiff, and that he instructed the architect to that effect. The latter, on the contrary, asserted that the surveyor was employed under the usual arrangement, as set forth in the documents, without any such special stipulation as that stated by defendant. If they believed the former they should find for the defendant; if they believed the latter they should find for the plaintiff, as undoubtedly the work had been abandoned; and on the authority of the case cited, as well as the usage proved, the employer became liable under these circumstances.

While the jury retired, Dr. Boyd submitted to his lordship that even supposing Mr. Fogerty had been instructed, as stated by

defendant, that was no answer to the plaintiff, unless it could be proved that he was aware of and had acquiesced in the alleged arrangement. [The Chief Justice took a note of the exception.]

The jury, after a brief deliberation, returned a verdict for the plaintiff for £124 14s. and costs.

SECOND COURT OF QUEEN'S BENCH—JUNE 17.
(Before Mr. Justice George and a Common Jury.)

Hazleton and Others v. Fogerty.—Fogerty v. Hazleton and Others.—In the first of these actions the plaintiffs, who are drapers, sought damages laid at £400 against the defendant, their architect, for alleged negligence. In the second, the plaintiff, an architect, sought to recover the sum of £232 6s., balance at foot of account furnished for designing and superintending the new warehouses of the defendants, situate in Henry-street, Dublin. Messrs. Kernan, Q.C., Falkner, Q.C., and Byrne, instructed by Mr. H. Oldham, solicitor, appeared for Messrs. Hazleton and Co.; Messrs. Heron, Q.C., Purcell, Q.C., and Boyd, LL.D., instructed by Mr. F. G. Tindler, appeared for Mr. Fogerty. The jury having viewed the premises,

Mr. Purcell applied on behalf of Mr. Fogerty to have his action tried first. His writ was served long before that of Messrs. Hazleton, and the case set down for hearing at the Easter after sittings. Messrs. Hazleton's action had been brought long after by way of set-off to his claim. He did not know how their case got in the list before his, as his notice of trial and abstract had also been lodged before theirs.

Mr. Justice George said he should take the cases as they appeared in the list.

Mr. Kernan suggested to have both tried concurrently.

Mr. Purcell objected, stating that the causes of action were distinct. Messrs. Hazleton and Co. could go on with their action if they thought they had a case, and his client would reserve his action till it was tried.

Mr. Byrne then opened the pleadings. Messrs. Hazleton and Co., plaintiffs, alleged that they had retained the defendant as architect to certain buildings to be executed by Michael Meade, builder, for plaintiffs, according to a certain specification and contract, but that the said Michael Meade did not execute the plastering of said buildings according to contract, and that the defendant did not use due diligence in overseeing him, whereby the plaintiffs suffered loss estimated at £400. The defences were—a denial of the negligence, and special defences to the effect that the defendant had, under the contract, withheld his certificate from the builder, and that while he continued to do so the plaintiffs entered into an arbitration with the builder on the subject of the matters complained of, which had all been already adjudicated upon; that the defendant was always ready and willing to direct the remedying of the defects, but was prevented by plaintiffs, and that the said defects were not of the nature and extent alleged.

Mr. Kernan stated the plaintiffs' case. His clients were drapers, who had employed the defendant, an eminent architect, to prepare plans for and superintend certain buildings in Henry-street. The plans and specification were fully approved of, and a contract entered into between plaintiffs and Mr. Michael Meade, the well-known builder, to erect the buildings for the sum of £4,650. Additional works had been ordered, which made the total cost nearly £8,000. By the contract everything was to be of the best description, subject to the approval of the architect, who had very full powers under it to order away bad materials and defective work, also to withhold certificates and employ another builder in case of default. The laths were specified to be lath and half, and the lime and sand to be of best quality; but Mr. Meade had used single laths and bad materials, so that the plastering would all have to come off. The defendant had certainly with-

held his certificate, and employed another builder to remedy the work; but his clients considered he had not done so soon enough, and they were losers thereby.

Mr. Justice George asked, was the architect a party to the contract?

Mr. Kernan replied No, but that he was named in and was cognizant of it.

Mr. Purcell drew attention to an important clause in the contract not read by his learned friend. By it the builder was to be paid not alone on the certificate of the original architect, but as an alternative on the certificate of any other architects who might be called in as arbiters. There was also an arbitration clause in the contract which had been acted on, and the builder paid on the award of the arbiters, not on the certificate of his client.

Mr. Kernan was about to call Mr. Dudgeon as a witness, when

Mr. Justice George suggested that those cases would be much better settled by arbitration.

Mr. Purcell said his client had always been ready and willing to arbitrate his claim on fair terms, but a cross action like this for negligence was calculated to injure his reputation as a professional man if not publicly investigated, and it was a matter should not be compromised without full provision for reparation in case, as was certain, that no negligence could be proved against him.

After some discussion it was agreed that both actions should be referred to the arbitration of Messrs. John Sibthorpe and J. W. Switzer, merchants, named on either side; and John M'Curdy, Esq., architect, as umpire.

We hope to give full particulars of the award in due course.

COURT OF BANKRUPTCY.

In *Re J. & D. H. Anderson*.—The bankrupts were builders and contractors, carrying on business at Templemore Park, Belfast. The meeting was an adjourned one previously held for the final examination. Mr. John Matthews, solicitor, appeared for the bankrupts; and Mr. Lynch, solicitor, for the assignees. Mr. Matthews stated that the case was that the adjournment had been made pending the sale of certain premises which the bankrupts had mortgaged. The sale had taken place, the sum realised being £660. Judge Miller observed that the report of the official assignee on the case was anything but favorable. He wished to know what was the opinion of the trade assignee. Mr. Lynch said the trade assignee had investigated the case, and did not oppose the passing of the final examination, believing that there had been a full and true disclosure of the estate and effects. Mr. Matthews observed that the case had been in court for five months. Judge Miller said he was not altogether satisfied with the personal and trade expenditure, which seem to him to have been very extravagant. However, as the case had been so long in court, he would allow the final examination to pass.

ADMINISTRATION OF THE FACTORY ACTS EXTENSION ACT.

ATTACHED to the Factory Acts Extension Act of 1867 are various modifications adapted to meet the special exigencies and customs of particular trades or localities, which it is in the power of the Secretary of State to grant on his being satisfied of their necessity. In the administration of the Act during the past twelve months some irregularities have occurred, on account of the different views held by the Inspectors of Factories in regard to the extent to which it was desirable that these modifications should be allowed; and the necessity of their agreeing upon a uniform course of action in this respect was clearly established by the publication of their half-yearly reports a few weeks ago. Mr. Redgrave acknowledged that he was prepared to give full effect to these modifications in every case where the customs or special exigencies of the trade or occupation affected by the Act clearly established that such a modification

would be convenient or desirable. Mr. Baker, on the other hand, expressed himself as opposed to the granting of all modifications after the 31st of March last, at which date those that he had himself granted expired. Since the issue of these reports, however, the whole question would appear to have been carefully reconsidered, and the result is the publication of a memorandum signed by both inspectors, which promises to remove all doubt and uncertainty in this matter; and we may anticipate in future to have the new Factory Law administered throughout the United Kingdom with all the consistency and uniformity that could be desired.

The most important of the modifications we refer to is that giving permission to take the hours of work between 7 a.m. and 7 p.m., or between 8 a.m. and 8 p.m., as may be found most convenient and desirable; and the inspectors have agreed that it shall extend in future to the following occupations:—Trades in London, Edinburgh, and Dublin; factories in which no person is ever employed under sixteen years of age; factories in connection with retail shops or dwelling houses occupied by the employer; factories in which the persons employed are of a class necessarily possessing superior intelligence and education; newspaper printing-offices; warehouses in which goods are polished, cleaned, wrapped, and packed up. Permission may be given, when required, to work under this modification from 7 a.m. to 7 p.m. only to the following trades when carried on elsewhere than in London, Edinburgh, or Dublin:—Letterpress printing, bookbinding, and the manufacture of tobacco. No modification is to be granted, however, under this section to any child under twelve years of age.

Permission may be also given, until the 1st July, 1870, to employ male young persons during the night in breweries, marine engineering works, and oil and seed crushing mills.

The eight half-holidays enforced by the Act each year may be given on different days, and another day may be substituted for Saturday, on which the weekly half-holiday may be given in any factory in which the necessity for such a modification is made clear.

Lads of sixteen years of age may be employed till the 1st of July, 1870, as adults in the enamelling of metal, in metal tube making, boiler making, gasometer making, marine engineering, in breweries, and in chemical works, when a medical certificate is produced that the labour would not be prejudicial to health.

MISCELLANEOUS.

FLOATING MEADOWS.—In the Atlantic Ocean a little to the west of the Azores, there exists, as is well known, a space seven times larger than all Germany, according to Humboldt, completely covered with a dense mass of marine vegetation. Monsieur Jules Lavinière has proposed to the Société d'Agriculture to make these floating meadows, as they are called, subservient to the purposes of agriculture. His suggestion is that the ships occupied during the summer in cod-fishing should in other seasons be employed in conveying this abundant manure to the Azores, where an entrepôt could be established, the weeds pressed and dried, and the mineral salts they contain extracted. Analysis has shown that these weeds possess the same fertilising properties as those already employed as manure on the British and French coasts. Perhaps our own agriculturists may find it worth while to inquire whether an inexhaustible stock of cheap manure has not, like guano, been here overlooked for centuries.

The distance by the Pacific Railway from New York to San Francisco is 3,305 miles. The present price for a through ticket is £30 15s.; but it will be reduced next year, perhaps, to £23. In either case the cost of diet will be £5. What a price to pay for a long and most wearisome journey! great part of it through wild, unsettled country, and across two mountain-ranges. And suppose the train runs off the rails in the Indian territory, what chance will the passengers have against attacks by the redskins? It will be interesting to watch the growth of traffic on this great railway, and to note whether there will be any diminution in the number of passengers by the Isthmus.

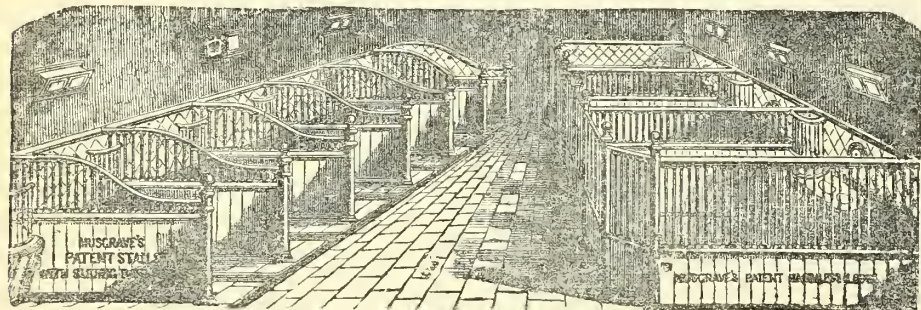
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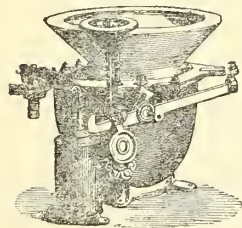
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House of Commons, 2nd March, 1864.

DEAR SIR,—In reply to your note, I beg to say that I have used both the sorts of Cement manufactured by your firm, and that of Messrs. Francis and Son; I mean the Cement usually called Roman Cement, or the more recent introduction of Portland Cement. I believe these Cements, manufactured by either of your firms, to be equally good. I know no difference, chemically or practically, between them; and I should use, and authorize to be used indifferently, either one or the other. You are at liberty to use this note, if you think it necessary.—I am, Dear Sir, your obedient servant,
Messrs. White & Son. (Signed) **WILLIAM TITE.**

From **R. O. MINNIE, Esq., Surveyor to Board of Ordnance, London.**
War Office, Pall Mall, London, S.W.,
3rd March, 1864.

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(Signed) **R. O. MINNIE, Surveyor.**

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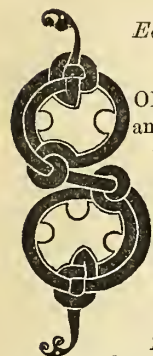
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The Irish Builder.

VOL. XI.—No. 230.

Ecclesiastical Architecture in Cork.



OME ecclesiastical buildings of an imposing and ornate character are in course of erection in the city of Cork. In a recent number of the local *Examiner* there appeared a description of them, and to it we are indebted for the greater part of the notes given below. *En passant*, we may remark, that we are glad to find the subject treated by our contemporary in a different style from that usually adopted by newspaper writers when describing architectural works. We congratulate our friends in the "beautiful citie" on those fresh proofs of their spirit, and hope that others may be stimulated to "go and do likewise."

Illustrations of buildings, both in the city of Cork and its vicinity, have appeared in the *IRISH BUILDER* from time to time. We shall be glad, on receipt of drawings or photographs, to illustrate others.

St. Mary's Catholic Cathedral.—The reconstruction of St. Mary's Catholic Cathedral will properly be a leading feature in our notice. While nearly every city in Ireland could boast a cathedral more or less deserving the appellation, Cork diocese has been content with an edifice under that designation, worthy only—in external appearance at least—of a country parish. No doubt, of late years the splendid square tower of the cathedral has risen in prominent beauty on the northern hill; but its erection tended to make the meanness of the church building more conspicuous, and the necessity for replacing the latter with a more suitable structure become more urgent. Sir John Benson has prepared the new design, a brief general idea of which we propose to convey. The architectural style adopted is the Geometrical, or that in use in the thirteenth century. By the proposed plan, the church will be enlarged to double its present size, and so altered and embellished as to render it one of the finest specimens of ecclesiastical architecture in the kingdom. The present cathedral is 145 ft. long within the walls, and it is intended to add to the east end, nave, choir, and chancel with four side chapels, and transepts with aisles; which will increase the length of the building to a total of 236 ft. in the clear, or a length over all, including the tower, of about 280 ft. The width will be 116 ft. 6 in. across the transepts, and 62 ft. 6 in. across the nave and aisles. There will also be added a clerestory, which will increase the height of the building to 79 ft. from floor line to ridge of roof, the height to the cornice under parapets being 56 ft. The ceilings will be richly groined. The pillars dividing the nave from the aisles will be of Portland stone, with red marble detached shafts; and those separating the chancel from the side chapels will be of Cork red marble with black marble shafts. The small shafts of the windows and clerestory will be composed of Galway black and green, and Cork red, marbles. The intersection of the nave and transepts will be supported by handsome piers, ornamented with sculptured figures, supported on projecting corbels and standing under rich canopies. The upper portions of these piers, which are square, will have neat marble shafts, carried on corbels, to receive the vaulting of the

arches. It is intended that the whole of the east end, including the side chapels and choir, shall be vaulted in masonry. Numerous windows of great beauty will illuminate the building, and in the preparation of the design the extensive employment of stained glass at a future period is contemplated. Internally the walls will be lined and dressed with Bath stone and marble. The decorations of the choir, chancel, and side chapels will be rich and elegant; and the whole interior will partake of all the characteristics of breadth and loftiness, massiveness and beauty of construction, and elegant profusion of ornament properly belonging to a great cathedral. The external outline of the building will be proportionately grand. To the side walls of the present structure will be added handsome buttresses and parapets crowned with graceful minarets, and the windows will be re-arranged in accordance with the style of the intended extensions. For the present southwestern porch will be substituted a larger and more elegant one, that will project beyond the line of the present railings, which are to be removed. The eastern end of the church will be square, having a large five-light window of great beauty. In the southern transept will be placed one of the principal doors of the cathedral, deeply recessed and lined on either side with marble shafts. This doorway is one of the grandest features in a very splendid design. Its external width will be 23 ft., and where the doors hinge, 10 ft. 6 in. Over the door is carried a gable, the upper part of which, reaching to the springing of the cathedral roof, will be pierced by a large rose window, very elaborately designed. The ends of the nave and the choir and transepts are to be supported by bold buttresses crowned with minarets, finished with carved crockets. These buttresses give a very fine effect to the edifice. The eastern end will show five gables, one in the centre for each choir, and one for each of the four chapels—the summit of each gable carrying a cross. In the angles of the building formed by the chancel and transepts will be erected extensive sacristies, &c., in keeping with the general design. Owing to the inclination of the ground in that direction, the building at the eastern end will be 100 ft. high. The dressings of the windows, buttresses, cornices, parapets, minarets, &c., and the external facing of the wall, will be composed principally of finely-dressed white limestone, the other portions of the walls being of the red stone of the district, carefully chiselled. To complete the cathedral, a spire will be added to the handsome western tower, as originally intended; and a peal of bells will answer back in melodious thunder the famous chimes of Shandon. Such is some general idea of this singularly fine conception of the eminent architect. A portion of the work, including the re-building of the buttresses, re-arrangement of the windows, and addition of the parapet and minarets to the southern aisle of the nave, has already been commenced. Mr. Richard Evans, Union-quay, is the contractor.

St. Finn Barre's Protestant Cathedral.—As an architectural work we gladly recognise the new cathedral as an important addition to our numerous beautiful edifices. We shall give a cursory glance at the present advanced condition of the structure. All the heavy work below the eaves line, and some above it, have now been executed. Entering by the old western gate of the churchyard, the first impression of the visitor is one of wonder and admiration at the extraordinary massiveness and solid grandeur of the pile. The whole exterior of the church is faced with neatly-cut blocks of grey limestone, from which it derives an appearance of great strength. Three splendid Gothic doorways in the western end are among the noblest features in the work. The central one is especially grand, being deeply recessed and richly moulded, of great external width, the interior of the sides lined with clusters of neat shafts, surmounted with heavy capitals, hereafter to be elaborately carved. Two square-headed doors fill the interior of the arch, and it is surmounted by a gable. The aisle doorways are similar,

only being smaller. Over the chief entrance is a magnificent rose window of great size and beauty. The north and south elevations of the building are very fine, though here, as in nearly every part of the edifice, its excessive ponderosity in some degree mars the grandeur of the effect. The five neatly-moulded windows of the aisles are very handsome, their heads having just sufficient of the Pointed style to prevent their being absolutely semi-circular. Massive buttresses occupy the intervals between the windows, agreeably breaking the smooth hard face of the walls. The clerestory gives loftiness and dignity to buildings, its windows corresponding in style to those in the naves, and both roofs are supported at their respective eaves on bold square corbels, which break the uniformity of the line pleasantly. The transepts jut out nobly from the main structure, their buttresses ascending even to the eaves of the high-pitched roof, and besides a tier of windows like those of the aisles, display in the gable of each a handsome circular foliated window, with pointed hood, beautifully moulded. In the apsidal termination of the church there is the same uniformity of window, buttress, and moulding which prevails throughout. The interior, even more than the exterior, conveys the idea that the architect aimed at great massiveness and solemn grandeur rather than mere beauty, or the accommodation of large congregations. Resembling Marlborough-street Cathedral, Dublin, in internal arrangement, it may be popularly described as a church within a church, the nave and choir being embraced by the side aisles and chapels, which have vaulted roofs. Great pillars of white Mansfield stone, with heavy capitals, supporting splendid pointed arches, separate the nave and the aisles; the intersection of nave and transepts is carried by huge, square piers of the same material, the angles neatly moulded. The choir is enclosed by handsome pillars of Cork red marble; and the latter material is also employed with good effect in the shafts supporting three tiers of white sandstone arches, which decorate the interior of the clerestory. Externally, it should have been stated, the windows are separated and relieved by limestone shafts. On the interior there are shafts of white sandstone to correspond, and deep hoods of the same material to the windows. These are the chief characteristics of the building as it now appears. Every part of the work is massive and costly, and it is but fair to say that it seems to be executed in the very best manner. Whatever one may think as to beauty or elegance of design, there is not a doubt the new Cathedral of St. Finn Barre will possess all the greatness and solemnity of aspect befitting such an edifice. The architect is Mr. Burges, of London; the contractors, Messrs. Cockburn, Great Brunswick-street, Dublin.

St. Vincent's Presbytery.—On the picturesque hill of Sunday's Well has risen within the past twelve months, in connection with the beautiful church of St. Vincent de Paul, a magnificent pile, almost equalling in grandeur of design the sacred edifice itself. It forms a very striking object in the rich landscape. The building is intended to include a residence for the Vincentian Fathers and a House of Retreat, with their appropriate appendages. Like the church, its style is Gothic, though of a somewhat earlier period. Messrs. Goldie and Child, the eminent architects of London, have treated the design with consummate skill and attention to splendid effect, at the same time that it is in no respect inappropriate or unsubstantial. Built at the west end of the church, the Presbytery will form two sides of a square, so as, with the church, to bound on the east, west, and south, a quadrangular court, whose northern boundary is the public road of Sunday's Well. The principal wing, lying east and west, is now complete, and the other has been commenced. At present we propose to give a general description of the building as it stands. Its principal face is towards the river, above which it rises to a height of several hundred feet, and its aspect is palatial, while possessing sufficient characteristics of

its religious purpose. In magnitude it is nearly as large as the church, beyond the southern line of which it is advanced a few feet, and contains four storeys. The front elevation is divided by massive buttresses between the lower windows, to correspond with the style of the church, and the windows with which it is pierced are very handsome, their frames and dressings, as well as the dressings of the buttresses, which are of limestone, contrasting well with the brown stone, which is the principal material of the walls. A very pretty feature in this elevation of the building is the circular turret at the south-west angle. At the base it is corbelled out from the main structure,—an ingenious arrangement which imparts to it an airy and picturesque appearance. It thus forms a bow 15 ft. in diameter, and, rising above all other parts of the edifice, it is capped with a conical roof and vane. Entering the basement at the south-east angle, from the terrace in front, and passing to the lofty and spacious corridor, we encounter first the ambulatory, which is the chief apartment of the structure. This, like the other divisions of the same story, occupies the whole width of the wing, minus the corridor, and measures 80 ft. by 22 ft., and is 17 ft. high. It is lighted by six very large three-light tracery windows—the main feature in that aspect of the building; and will have a rich groined ceiling, the ribs resting on carved capitals, supported by shafts of Cork red marble. It is a singularly handsome and cheerful hall, while its splendid windows command a view of large extent and singular loveliness. From it we pass into the refectory, at the western-end of the wing. This is a smaller but lofty and handsome room, about 22 ft. square, and is lighted by four windows, two of them large and elegant, resembling those of the ambulatory. Adjoining are the kitchen, pantries, bath-rooms, &c. Returning to the foot of the great stone staircase (which, supported on pointed arches and red marble columns, and having a handsome window on each landing, gives access to the second and third storeys) we ascend to the first floor. Here we find ourselves on a level with the public road and court-yard, from which there is a suitable entrance. Looking into the court-yard is a wide and lofty corridor, illuminated by six handsome two-light windows, with rich heads filled with geometrical tracery. The first apartment on our left, being over the ambulatory, is a parlour, 22 ft. wide and 18 ft. long, and next is the library, 60 ft. by 22 ft. having five windows, second only in size and beauty to those in the basement. They are hooded on the exterior with two semicircular arches, supported at the middle of the window by a neatly turned shaft with square moulded capital. In all other respects, too, the library will only be second to the ambulatory. To it adjoin the community room and visitors' parlour, corresponding to the refectory below. From the parlour is obtained the first access to the turret at the south-west angle, into which the room opens by a pointed arch. On this floor the turret is pierced by four beautiful windows, with traceried heads, and separated from each other by neat shafts. It would be difficult to imagine a more delightful little room than this. Projecting beyond the line of all other parts of the building, it has a clear view to the east, west and south, over a panorama which embraces every feature of winding river, green hill, busy city and picturesque suburban residence, sufficient to gratify the taste of the most fastidious lover of scenery. The third and fourth storeys are occupied by bed chambers—eight on each floor. These are splendid rooms, many of them as large as moderate-sized drawing-rooms. To the finest of them, however, might be preferred the little eyrie in the top storey of the turret, the prospect from the windows of which dwarfs all that we have previously been recording. All the joinery of the building will be stained and varnished. The front line of the building, we have stated, projects beyond that of the church. Their adjacent ends overlap by some 20 ft., bringing the south aisle of the church into com-

munication with the presbytery, from which it will be entered by a door in each storey. Besides the two entrances at the east end already mentioned, there will be another near the western angle of the building, almost under the turret. To bring the church and presbytery into contact, about 12 ft. will be added to the west end of the former. To accomplish this, the present unsightly western wall will be removed, and the intention of erecting a tower and spire there, as contemplated in the original design of the church, will be abandoned. Another and now more suitable site for a square bell-tower has, however, been chosen, and the foundations already laid at what will hereafter be the north-west angle of the church. We have seen the design, and it will be sufficient to say, in general terms, that it is in every respect worthy of the magnificent group of buildings of which it will be the crowning ornament. Gothic like the church, its base will be of brown, and its upper storey of grey limestone, pierced by richly-ornamented windows with Gothic heads; and the summit will be decorated with graceful minarets at the angles, and lesser ones in the middle of each face. At the angles of each storey there will also be figures on pedestals, under canopies. In the base of the tower will be a singularly elegant and ornate porch, and above the entrance-door a statue will be placed. Such is a general idea of the character of this fine architectural work. Even the slight sketch we have given of the plans and design must show how creditable they are to Messrs. Goldie and Child; and we have to add that the execution of the work has been entrusted to Mr. Barry M'Mullen, of Mary-street, to whose skill and enterprise as a builder many religious edifices in both city and county bear ample testimony. The grounds at the river side of the church and presbytery are now being laid out in a series of terraces, that will form the most delightful pleasure grounds in the neighbourhood.

St. Mary's Church, Pope's-quay.—Amongst our most beautiful houses of worship is the Church of St. Mary, in connection with the Convent of the Dominicans. The handsome portico added to it within late years confers upon it its chief exterior beauty. Interiorly it has always been one of the most admired of our churches. There are few things of the kind in the kingdom finer than its groined ceiling, supported by great Corinthian columns. One marked deficiency in the structure, however, has been the absence of any chancel or apsidal terminations worthy of the name, a consequence of which is that the sanctuary projects unduly into the choir. It has now been determined to perfect the symmetrical and cruciform shape of the church by adding an apsidal chancel of 40 ft., and also extending side chapels in same direction. The width of the chancel will be the same as that of the nave, 30 ft. The side chapels may be described as prolongations of the aisles, each 25 ft. long and 12 ft. wide, rows of columns similar to those about the altar separating them from the chancel, with which they will be parallel. A superb altar, in a style corresponding to the building, will form a grand central object in the beautiful interior. The internal decorations will be of a singularly beautiful and splendid character. The ceiling itself will be a fine piece of artistic arrangement and elaborate ornamentation. The very beautiful design is by Messrs. Goldie and Child, of whom we have already spoken in connection with St. Vincent's Presbytery. Other new works are to be executed in connection with the church improvements. In the north-east angle formed by the eastern side chapel and transept will be erected a priests' sacristy, 35 ft. long and 17 ft. wide, and over that will be a winter choir and chapter house of same dimensions. At the east side of the church adjoining the transept will be another building, 42 ft. long and 20 ft. in width, which will include a boys' sacristy and visitors' parlour. One of the most necessary of the contemplated improvements is the construction of a covered passage and staircase, by which direct communication will be established be-

tween the priory and the priests' sacristy. The contract for all these works has been taken by Mr. Barry M'Mullen.

St. Marie's of the Isle Convent Chapel.—The extensive convent of the Sisters of Mercy forms a prominent feature in the south-western section of the city, and derives a special interest from its proximity to St. Finn Barre's Cathedral. The convent as it at present stands has been some ten or twelve years built, but the completion of the design is only now being accomplished by the erection of a chapel, with tower and spire. The foundations of the chapel were laid, and several feet of the walls raised ten years ago, and then the work was necessarily suspended. Within the past year a movement for its completion was set on foot. Since then the work has been carried on (and is already far advanced) by Mr. Barry M'Mullen, under the direction of the original architect of the building, Mr. William Atkins. The style of the chapel is early 14th century Gothic, and the treatment of the design is very good. Standing at the southern extremity of the convent, the chapel is 75 ft. long and 23 ft. wide, with apsidal termination. The apse is pierced by three rich traceried windows, with finely-moulded hoods on the interior, and marble shafts at the angles. Between these windows will be marble shafts supporting statues, each surmounted by a tasteful canopy. From the south side the chapel will be lighted by four two-light windows. On the north side it joins the convent, the choir of which opens transept-wise into the chapel, from which it is separated by four double rows of columns, supporting richly-moulded arches. Above these are two neat piercings, through which the occupants of the convent infirmary can see the altar. West of these, resting on a cornice, supported by corbels, will be an organ chamber, beneath which is placed the sacristy, entered from the church through a handsome doorway. In the west end there is a very fine four-light geometrical window, with three large circles in the head, richly foliated. To the top of the arch the window measures 30 ft., and it is 16 ft. wide. At either side of it, on the exterior, are pretty stone canopied niches for statues. The roof will be open, supported by massive beams and curved ribs, the ends of the beams carved into figures of angels. To the ridge, the height will be 45 ft.; to the eaves, 30 ft. The walls of the chapel, like those of the convent, are of red sandstone; the dressings of all the windows and doorways of limestone, and the other arches of Caen stone, all the shafts and pillars in the structure being of Cork marbles, red and green. Altar and reredos will be in a style to correspond with the rest of the building, and the flooring will be of encaustic tiles. Throughout the interior there will be abundant decorations. So much for the chapel. In the angle which its western extremity forms with the convent will rise a handsome square tower, with spire 151 ft. in height. Through the base of the tower will be the public entrance to the church, by a beautifully moulded doorway. The upper storey of the tower will display on each face two handsome two-light windows; and the elegantly tapering spire will give a very effective vanishing point to the entire group of buildings. Viewed as a whole, the design is in no slight degree creditable to the architect, and all the arrangements appear convenient and appropriate. Mr. M'Mullen's high reputation is sufficient guarantee for the proper execution of the work. Additional strength is given to the appearance of the structure by neat buttresses at the angles. The work has now so far advanced that the roof is being constructed; and we shall be glad when, by the completion of the undertaking, an architectural ornament of no mean order will be added to that part of our city.

St. Patrick's Convent of Charity.—The new convent for the Sisters of Charity of St. Vincent de Paul has been recently commenced in a very healthy and commanding situation on the Wellington-road. In connection with the convent there will ultimately be a House of Providence for training young women to

household avocations, so as to enable them to become self-supporting—an institution of great value, and much needed in Cork; also a ward for the treatment of a particular class of surgical cases, this being founded in accordance with the will of the late Doctor Murphy, of this city. From an architectural point of view, the erection of the convent will be a material improvement. It will form a prominent and beautiful object on the high ground off the Wellington-road. The design is by one of the Sisters. Its style is Grecian, somewhat resembling the convent of the same Order at Peacock-lane. It includes a main building of four storeys, fronting the road, the general dimensions being—138 ft. long, 32 ft. wide, and 53 ft. high. From the ends of the main structure recede two wings, measuring 30 ft. by 32 ft. Each of the upper storeys will be lighted by eleven round-headed windows, the number in the basement to be ten, with a handsome doorway in the centre. The materials used are the red stone of the district, with limestone quoins and neat white brick dressings to the windows. The effect of this combination will be very pleasing. Mr. Edmond Flynn, Blackpool, has the contract for the building.

VENTILATION OF SEWERS.

"The influence of Sewer Gas on the Public Health; and the Theory of Ventilation as required in Sewers," was the subject of a paper recently read before the Social Science Association by Dr. Carpenter. The proper construction and ventilation of sewers is the most important branch in sanitary science. We hope that before adopting the expensive system of works projected for our city with a view to divert the sewage from the Liffey, a due consideration of the subject will not be overlooked. Dr. Carpenter's paper is a valuable one, and we regret that we cannot print it *in extenso*. The following are his remarks on the production of gas in sewers:—

"The early sanitarians reasoned in favour of small sewers, partly on the idea that they would keep perfectly clean, and that no decomposition could take place, and therefore that no gas products would be formed. Theory and practice do not, however, go together; sewers are never constructed in ordinary towns as the early sanitarians intended that they should be; they do not, as a rule, flush clean; they are often badly laid, and as a consequence deposit takes place in them, and decomposition, with the liberation of sewer gas, results. Now this sewer gas makes its way more easily out of the large sewers of London, with the many open gratings existing therein, so as to some extent to obviate the chance of pressure upon the traps, which exists much more forcibly in the pipe sewers of less extensive drainage areas. It will form at times very abundantly in the house drains, and these being, like gas receivers, open at the bottom only, the sewer products will make their way through the traps into the houses; and if the traps become, as is often the case, untrapped, especially in dry weather, there is a ready means for the entrance of the gas into the house, independently of the means afforded by the water in the trap itself, which is a ready conductor of the miasms—absorbing the agent on one side and giving it off on the other.

Theoretically, ventilation of sewers ought not to be necessary, for, theoretically, no deposit ought to exist in a sewer; but practically this is found at times an impossibility, and an efficient system of ventilation must be provided.

The experience obtained in extended drainage areas, as well as that from more isolated districts, has shown that trapping is only stopping the danger at one point and forcing it in another direction, quite as dangerous to those exposed to its influences. It follows, therefore, that the only satisfactory solution of the difficulty is the prevention of its intrusion into houses at all, and the prevention of its collection in sewers in that concen-

trated form which leads to mischief. Its formation cannot be prevented,—not at least until sewers are so constructed, as to their fall and their workmanship, that no deposit is likely to take place in them at all, and that no settlement shall change their level, whilst the character and the quantity of sewage continue the same. It is seen, therefore, that miasms will form; how, then, are their influences to be avoided?

The nature of this miasm has been well pointed out by various chemists and medical authorities. All concur in the belief that dilution destroys it; that if sufficiently diluted with air it becomes innocuous, and its sting is taken away; when it first escapes from a sewer it carries with it some condition which is injurious to life, tending to prevent some necessary change in the blood, or other vital tissues, either by its own power or by means of a property to which it simply bears the relation of carrier. If it be mixed with sufficient air, especially if that air be ozonized, the miasm becomes oxidised and comparatively harmless, or if not so oxidised its presence is not injurious to life. Just as a minute quantity of urea in the blood is not injurious, yet if the purifying influence of the circulation through the kidney be interfered with, or obstructed, a rapid change for the worse results. So again with carbonic acid; if the ventilation of lung structure is interfered with, serious damage is suffered; even the ordinary ventilation through the pores of the skin must not be stopped, or some change takes place in the body which is not consistent with perfect health.

It is seen that the circulation of air, or of air-carrying fluids, is incessant in both plants and animals; that this incessant action is the result in a great measure of chemical and physical changes in the moving fluids; that the safety of animal as well as of vegetable life depends upon this incessant movement; that if this movement can be produced and continued in sewers, no sewer gas could exist in a form sufficiently concentrated to be hurtful to human life.

Professor Graham and others have pointed out that nature has given to gases a law by which they have a tendency to diffuse themselves inversely as the square roots of their densities. This law certainly comes into play as soon as ever the gases are disengaged, at once tending to produce motion in the air. This motion will be assisted by the continuous changes of temperature following upon the quantity of hot water going into the sewer; it will also be encouraged by the presence of a flowing stream, varying in depth, and keeping up a varying circulation, causing an incessant motion of the air: as sewage rushes down, air must rush up to occupy the vacant place. Our problem, therefore, is how to render this circulation positively continuous, and to prevent its sinking into that dead calm which arises when the forces oppose one another, and which then allows the air to become saturated with sewer miasm. This has been effected most perfectly in our district, by compelling every new house to have ventilation for itself. The soil-pipe is continued upwards in a straight line above the level of the pan between the trap and the sewer, and it is made to terminate by an open extremity above the eaves of the house, away from a window, and not close to or level with a chimney. Every connexion with the sewer requiring the presence of a trap has that trap guarded from the consequences of pressure by a ventilator similar to the soil-pipe, the latter being placed as close to the trap as possible. It is found necessary to make these shafts ascend straight up, and not curve or turn at right angles, or their efficiency is interfered with. The result of making these innumerable openings at the higher points of the sewer has been to promote a rapid circulation through the sewer, by which all sewer gas is removed as quickly as formed by dilution and deoxidisation, and no concentration can take place. If any of the traps which may be considered absolutely necessary in the house should get out of order, then the introduced gas would be com-

paratively harmless, because so diluted; but every communication with the sewer other than that of the W.C. is indirect only.

These innumerable openings act like the pores on the skin, or like the stomates upon the leaves of plants. They are themselves causes of motion, for the air in the sewer of a large town will always have a temperature and density different from that outside; it will always be warmer in cold weather, whilst in hot weather it will be much more loaded with moisture. Differences of temperature, density, and moisture, will always be sufficient to determine a circulation, provided entrances exist for fresh air, as well as exits for that which has passed through the sewer.

The ordinary manholes and gullies in the streets will provide these openings, and more often lead to a down-draught than to any upward current of foul air. I have often found this to be the case in the ventilating places which have been opened near the lower ends of our Croydon sewers; air enters instead of finding an exit. The principle to be obviated is stagnation, whether of solid, of liquid, or gas,—deposit must not be allowed, fluid must always run off. Let there be also innumerable openings near the tops of the houses, and it may be safely assumed that no stagnation will exist in the sewers themselves, for these openings will be the promoters of incessant movement. Let every water-closet have its movement-promoter, its safety-valve, in the pipe I have mentioned; let every trap which it is absolutely necessary to use for the protection of the inmates of a house, be in a similar manner protected; let every pipe, not actually conveying sewage, have an indirect communication with the sewer only. Let all openings in the streets be untrapped and everything done which will promote sewer circulation, and disease in every way will become, as it has been in Croydon, more tractable, and the effects of drain-poison almost unknown.

It may be argued that these recommendations apply only to pipe-sewers, and will not do for the large culverts now being constructed in London. This I deny; they can be ventilated as well as the Southwark subway, or the metropolitan railway tunnels. If they contain deposit they are badly constructed, and such bad work ought to be remedied. It is becoming more and more certain, however, that more mischief arises in the house-drains, where stagnation can take place, than in the main sewers in which the main current is ever flowing; it never stagnates sufficiently long to allow of decomposition taking place, except under the most exceptional circumstances, which would be fully guarded against by the precaution of having proper charcoal ventilators in the manholes of the streets, at those places at which an up-current might be established—as at the top of a sewer having a rapid fall towards one on dead level. These ventilators have been often used in our streets; a most efficient one has been lately perfected by our engineer, Mr. Latham, by means of which the charcoal is protected from rain, and the air compelled to pass through a double sieve. Various other ways may be adopted for promoting rapid circulation in the large sewers better known to engineers than to myself, but the correct theory of sewer ventilation is undoubtedly motion. Motion is success, stagnation is destruction or defeat. I have not supported by figures the proposition I have submitted, because it has been found impossible to isolate the districts so as to place them under the same conditions; but I may simply state that the mortality for the parish of Croydon for the quarter ending March 30th, 1869, the quarter which generally has the highest rate of mortality, was 18·53; the death from fever in the same quarter were nil among nearly 60,000 people. The mortality for London in the same quarter was 25·0; that for all England, 24·84.

The idea of reading this paper arose from hearing at the Society of Arts a paper upon house-drains, which seemed only to urge traps as a remedy for smells. I say ventilate; do not trap."

VILLA, EDEN PARK ESTATE, NEAR BECKENHAM, KENT.

THE illustration which accompanies the present number is a Villa Residence about being erected on the South Eden Park Estate, near Beckenham, Kent. The designs are by Messrs. J. and W. Fogerty, architects, Westminster Chambers, Victoria-street, London. The material is white brick, with bands of red and black bricks and occasional dressings of Bath and Portland stone. It is one of five villas now in course of erection on the same estate, costing about £4,000 each. Messrs. Bracker and Sons, of Great Ormond-street, are the contractors.

HOLYWOOD CHURCH COMPETITION.

WE understand from our contemporary, the *Northern Star*, that the design sent in under motto "Crozier" has been unanimously selected from among the numerous designs furnished. The author is Mr. T. Hevey, architect, of 12, Linenhall-street, Belfast.

We shall lay the particulars before our readers in next number.

HOT WATER APPARATUS IN VINERIES.

THE best finished white Muscat grapes we have ever seen were cut from one or both of the remarkable vines that snake-like ascend the back wall of the old pine stores at "The Cottage," Raheny. We recently had the pleasure of seeing Mr. Brady's remarkable vines, and finding them in more than their former vigour, and carrying a marvellous crop,—in fact, a far heavier one, almost than we would care to let ripen. The range is more than 80 feet long. Previous to Mr. Brady's occupation, the old-fashioned smoke-flue was the heating medium in this and another extensive range, including a raised centre and side wings, forming a combination of plant-house and vinery. On the occasion of our visit we found a great change in this respect. Few at the present time will question the value of the hot-water system as the means of supplying atmospheric heat for horticultural purposes; least of all, one so thoroughly practical and intelligent as Mr. Brady. For the smoke-flue he has substituted in both ranges one of the most complete and effective, and, as he informs us, one of the most economical hot water apparatus that have come under our notice. It has been executed by the eminent house of Hodges and Sons, Westmoreland-street. The apparatus consists of their own vertical multitubular boiler, which, with the setting, occupies remarkably small space, the fuel being supplied from above. It is connected with four-inch flow and return metal pipes, controlled by an arrangement of shut-off valves, which enables the gardener to have each house, or compartment of house, at a different temperature, though all heated by the one boiler. Provision for supplying atmospheric moisture is made by means of troughs cast upon the pipes, which, by a simple, but ingenious, contrivance of brass tap and syphon, are quickly filled with hot water from the pipes themselves, causing immediate evaporation. Another useful feature of the arrangement we noticed was the insertion of a brass cock at each elbow or bend where it happened to be favourably placed, from which to draw a supply of hot water for tempering that used for syringing, watering, or other purposes. Each range of house is from 80 to 100 feet in length; and

Mr. Brady assured us that nothing could be more effective or satisfactory than the way in which the heating apparatus did its work. As with Mr. Brady its erection was not merely an *ouvrage de luxe*, we asked him as to the consumption and cost of fuel. His reply was, "merely nominal."

A SANITARY COUNSELLOR.

WITH a view to urging improvement in the sanitary condition of the town of Drogheda, the local *Conservative*, in its leading article on Saturday last, says:—

"A local gentleman of position, whose profession peculiarly qualifies him to advise in a matter of the kind, has suggested to us the advisability of directing the attention of the Corporation to a very simple and cheap method of improving the sanitary condition of the town. His plan is this:—During the continuance of dry weather the water-carts (are supposed to) go round the streets several times each day to lay the dust, and he proposes that disinfectants should be mixed with the water. Thus, by one operation, the health of the inhabitants may be guarded, while their comfort is being provided for. The expense of this simple plan need not deter the Council from following it. A few pounds will provide sufficient carbolic acid or chloride of lime to disinfect the whole town during the summer months, and, even though the cost were high, there should be no hesitation in adopting any promising measure to stay the ravages which disease is busily making, particularly among the young. It is a wonder to us that parents, whose children are falling victims to scarlatina, and who must be aware that the malignancy of the pest is due to the bad sanitary state of the town, are content to submit quietly to any mismanagement or neglect on the part of the local boards charged with the care of the public health. It is a disgrace to Drogheda and to Drogheda men to say that with an abundant supply of water flowing under their streets, no proper steps have been taken to have the sewers flushed. Surely, when the health of all is so deeply concerned, the petty differences which exist between the Corporation and the Water Works Company ought to be forgotten, and the relations of seller and consumer should be at least temporarily resumed. Did any of our readers observe the extraordinary method adopted to cleanse the sewers the other day, viz.—dragging the water-carts to the top of the highest streets, and emptying their contents into the water-tables, making mimic streams for the amusement of idle little boys? Is it any matter for surprise that other towns, with far less natural advantages, are fast distancing Drogheda in the race of progress, when with modern and suitable appliances at hand, we choose in preference the oldest, slowest, and most defective methods of doing everything. Some day we expect to hear of the Town Council incurring the expense and trouble of importing a cargo of fig-leaves to dress themselves with, for no better reason than admiration for the antiquity of the fashion set by the erring pair, our first parents! But from the sewers of Drogheda to the bowers of Eden is much too great a transition—we shall therefore only express a strong hope that the Town Commissioners at their next meeting will take into consideration the suggestion we have made at second-hand, and adopt that, or some equally simple method, of disinfecting and purifying the town. And as they have lately attended with more diligence to their duties, we trust they will not reject good advice, even though given in an unacceptable way. One thing we would say to the members of the board who themselves live in the town, in the belief that they will do wisely to act upon it—Don't submit to any obstruction or dallying on the part of gentlemen who have the country to retire to, and pure air to breathe whenever they please, but insist, for your own and your families' sake (if there are any

members of the last surviving), that immediate and adequate steps should be taken to check the spread of disease, and reduce the present alarming state of mortality.

WIRE TRAMWAYS.*

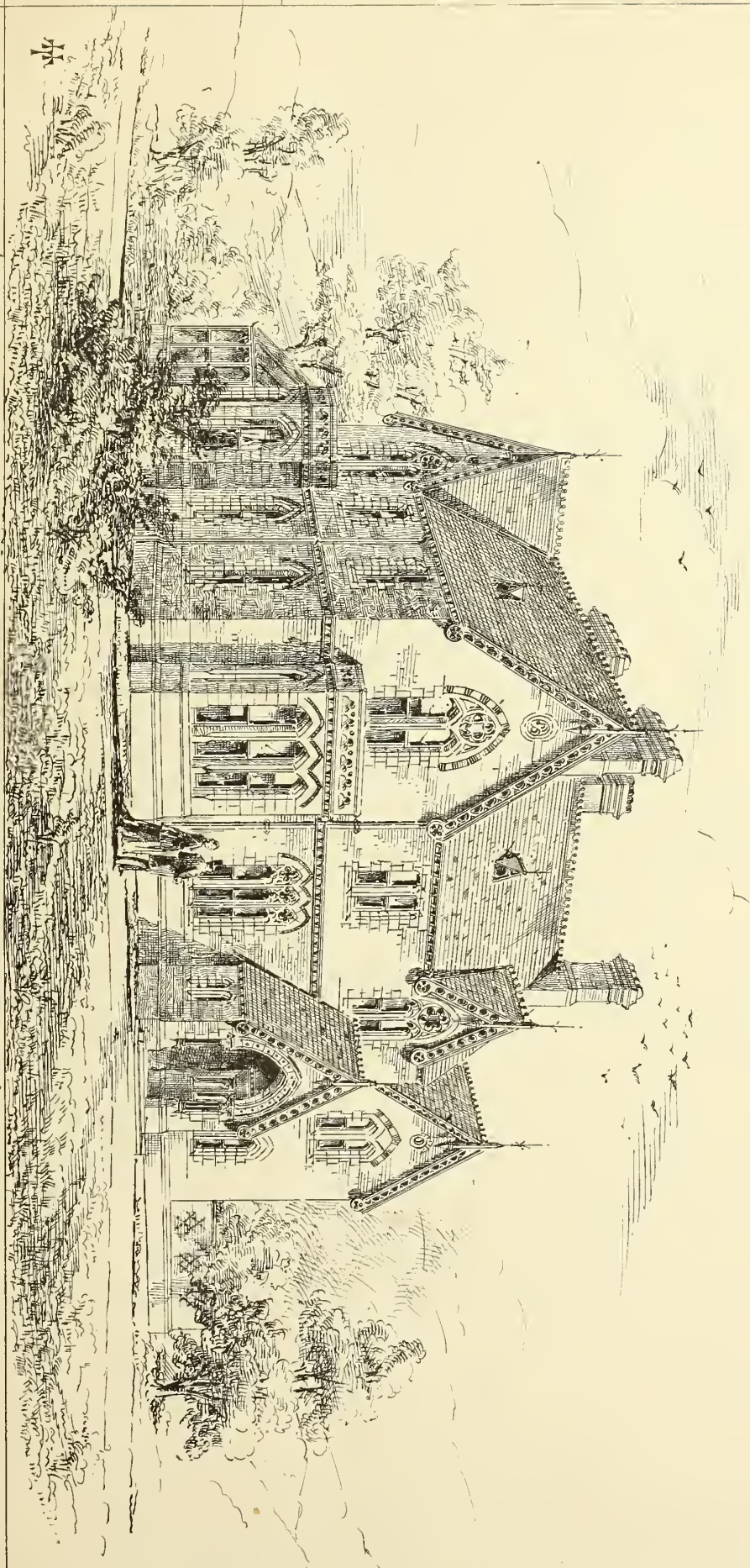
ALTHOUGH the railway system is now in its fourth decade, we are still in the habit of drawing comparisons between its speed and comfort and the days when the performance of a coach journey between London and York was thought no common feat. Yet this very mode of transit was a sharer, to a large extent, in those obstacles which always present themselves to all new inventions—obstacles which, while distasteful to originators of new schemes, are not without conspicuous advantages, inasmuch as they serve to test, in a tolerably conclusive manner, the real merit of each new invention presented to the public.

No inventions are more likely to contribute to the welfare of mankind than those tending to promote and increase the facilities for intercommunication between different places, which adds to man's power to render himself *en rapport* with his fellow man or which enables him to transmit the produce of his land, whether vegetable or mineral, at a moderate expense to the point where a want for such produce exists. It is well known that one chief obstacle to the advancement of many, if not of all, our colonies, is the difficulty of transmitting the produce raised or manufactured by the settlers to a market at such a moderate expense as will admit of a profitable business being transacted alike by the buyer and the vendor. In numerous instances mines otherwise valuable at present remain useless to their owners, although in many cases but a moderate distance from a railway station, simply from the excessive expense of any arrangement hitherto available for transporting their produce, in consequence of the obstacles which present themselves to the construction of any road-way.

The present railway system has, however paradoxical the statements may seem, in one sense fought against itself. It is during the days of its infancy it has been decidedly an expensive system. The laws of physics were studied by early engineers to the neglect of those of commerce, the result being that while in certain districts we have unprecedented facilities for travelling or transmitting our goods, yet we find our railways are not profitable, nor is the system so generally applicable to all exigencies as to render it anything like generally available for all purposes of transit. In a word, a railway to realise even a moderate profit, can only be made where there is a large general traffic, and considerable natural facilities for its construction. Such a system as this is useless to transmit the produce of some quarry or mine of value, but which is surrounded by a rugged country abounding with ravines and precipices.

There is a mode of transit which has been practised in India and Australia by means of a rope stretched from point to point, but which as yet has been only what may be called a local arrangement used principally for bridging rivers or ravines. A scheme has lately been brought before the public which proposes an extension of this arrangement, and to apply it to the transmission of goods over long distances through countries where the ordinary railroad, from the reasons already stated, is inapplicable. The system known as the wire tramway is an attempt to convey goods over natural obstacles at so moderate an expense as to render it possible to profitably work collieries, mines, quarries, &c., situated in wild or mountainous places. The scheme is still comparatively in its infancy, and is capable of much development, but the essence of the plan is perfect, and a wire tramway—as it is called by the inventor—is already in actual practical operation, a line of three miles being successfully worked in Leicestershire at this moment. It runs from some granite quarries—the property of

* From the *Builder*.



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Messrs. Ellis and Everard—at Markfield to Bardon, a station on a branch of the Midland Railway. The line is conveying stone from the quarries to a powerful crushing machine at Bardon, to be broken for road metal. The line has been constructed to carry 100 tons a day, but has never as yet been worked to its full powers. It is actuated by a double-cylinder portable engine of sixteen-horse power, but which, like the tramway, is not nearly fully worked.

The nature of the scheme is simple, and has been already briefly described in these columns. It may not be useless, however, to recur to it. To suspend a weight from a rope supported by a post at either end would seem simple enough; to move the rope with such load would likewise appear easy to accomplish; but to cause the load to pass the post is another matter, but yet one that a little reflection will show can be managed without difficulty. The rope passes twice over the ground in one of the modes of arrangement, being, in fact, an endless belt passing at one end of the line round a Fowler's clip-drum, and at the other round a large pulley, or wheel, with a deep groove in the rim. The rope between the termini is supported on posts of any reasonable height, resting at these points on small wheels grooved in the rims, to prevent the rope slipping from them. On motion being communicated to the clip-drum, the rope moves also at the same speed as the periphery of the drum, of course. Any weight hung on the rope will move with it, and supposing the weight to be able to clear the posts, it will move from end to end of the line, and were it not for the drums at the ends would move continuously; indeed, by proper arrangement and formation of the hooks, they would pass round these, and then the load would move continuously if required. The posts which support the rope are placed midway between the up and the down line of rope, and have at their upper extremities cross bars, at whose ends the grooved wheels are placed at such distance from the upright as to bring them in a line with the rope; these wheels act as friction rollers, and rotate as the rope moves.

The rolling stock, if we may call it so, consists of a number of boxes, each of which is provided with two iron hooks lined, where they rest on the rope, with wood; the shape of these hooks is the method whereby the boxes pass the posts. At the place where they hang on the rope they are simply hooks; a little below the rope, however, they spring back with a curve, similar to that of the bar which suspends the flat pan or plate used for weighing butter, &c., by cheesemongers. This curve leads the hook or hanger clear of the wheel supporting the rope, and when quite below, it bends in horizontally, and supports the box which thus hangs below the wheel, its centre of gravity coinciding with the centre of the rope. When the rope moves the box moves, and the depth of the groove in the supporting wheel being but little in excess of the diameter of the rope, and the wood liners of the hooks being suitably curved, they pass gently up on the edge of the wheel and down the other side to the rope again, without perceptible jerk of any kind. From the foregoing it will be obvious that so long as the supports and rope are of sufficient strength to sustain the load and the hauling power adequate, any given load may be transported from place to place without difficulty. The boxes will hang true, irrespective of the shape of the hangers connecting them with the rope, so long as the centre of gravity is kept in a proper line.

The question of curves may be dealt with in a variety of ways. The plan at present adopted at the Markfield and Bardon line is a series of wheels set with their axes at an angle both with the horizon, and also with each other, so that they would, if produced, meet in one common point, whose distance from the wheels would be proportionate to the rapidity of the curve. The number of wheels varies with the amount of alteration of the direction of the rope that is found necessary. The arrangement at the unload-

ing end of the Bardon line is simply a light angle iron, curved round the same centre as that of the clip-drum, save that it is farther away from the latter, in the opposite direction to the line of rope. This angle runs parallel with the rope for 2 ft. or 3 ft., and at the incoming side curves gently up higher for a short distance, and then inclines all round to its other extremity, which is a little below the rope level. The hangers of the boxes are each fitted with a little grooved trunnion, and as each box comes to the angle iron, these trunnions pass on to it, and the impetus of the box causes it to run the trunnions up the angle iron, thereby lifting the hooks from the rope, and it then has the falling incline, down which it runs to an attendant, who upsets the box over a railway truck standing beneath, and when empty allows it to pursue its course along the angle iron till it rolls gently on to the rope, to pursue its way back to the quarry at Markfield, where a somewhat similar arrangement is provided, the boxes being there shunted by hand to be loaded. These arrangements are all capable of sundry modifications.

The general dimensions of the details of the Bardon line are as follows:—The posts are from 10 ft. to 12 ft. high; the carrying wheels are 15 in. diameter on bottom of the groove; the posts are about 150 ft. apart, with one exception, where it was found necessary to place them 600 ft. apart; the two supports here are about 40 ft. in height. The clip-drum is 4 ft. 6 in. diameter; the distance between the up and the down line being also 4 ft. 6 in. The rope is a wire one, $1\frac{1}{2}$ in. in circumference. The speed of the boxes is about four miles an hour, though this may be considerably exceeded. The boxes carry about 1 cwt. of stone, when loaded.

There is much reason to anticipate that the principle of moving loads, especially minerals, along a rope, will prove of much value to contractors or others engaged in erecting large buildings, from the facility with which a line can be constructed between quarries, brickfields, &c., and the scene of operations. Large structures, taking two or more years to complete, could have their lines put up at moderate cost, and on the completion of the work the line could be removed elsewhere. The contractor could have either his own post and rope, or hire so many thousand yards or so many miles of line, for such time as he required.

The employment of the system promises, too, the development of mines hitherto either unprofitable or altogether unworked for want of cheap transport. In a word, it promises to supply that which ordinary railways do not furnish, a line portable, cheap, and which may be any length from 100 yards to 100 miles. Some doubts have been expressed as to whether it could ever be worked on the system of a main line and branches, whereby more than one colliery or mine could be worked at the same time. There is no difficulty whatever in arranging such a system, the only requisite being suitable shunting arrangements, and to have the main line a little stronger than the branches. Colliery proprietors and others possessing mineral property appear to entertain a sense of the probable value of the scheme from the inquiries they have hitherto been making into the matter.

L A W.

COURT OF BANKRUPTCY—JULY 13.

In Re *Horner*.—The bankrupt, an Englishman, for some time resident in Abbey-street, described himself as a commission agent. He came before the court for final examination. Mr. Harris appeared on his behalf. The passing of the examination was opposed by Mr. Seeds on behalf of a creditor for £370, and by Mr. Purcell, Q.C., on behalf of the liquidator of the General Exchange Bank. Mr. Seeds stated that it appeared by the bankrupt's schedule that all the creditors, except one, were English; that his debts

amounted to £16,267 4s. 3d., and that his assets were *nil*. He stated also that the bankrupt's schedule was unvouched, and that he had no books of account. His schedule showed that on the 1st of May, 1867, he had a balance in capital of £7,770, consisting of shares in the General Provident Insurance Company, the London Offices Company, the Oil Company of Wales, the Union Cement Company, the National Coal Company, the London Provincial Coal Company, and the Feather Company, &c. Mr. Seeds asked that under the circumstances of the case, as the bankrupt's debts had been all, with the exception of one, contracted in England, his lordship should either refuse to allow the bankruptcy proceedings to continue, or adjourn the final examination *sine die*. Mr. Harris contended that his lordship should entertain the case, as the bankrupt had traded here for the required period of time. Judge Miller said it was manifest that the bankrupt had no business in this country. At present he could not see that the bankrupt had a shadow of a case, except, perhaps, that he had found England too hot for him. A certificate obtained in Ireland was a very good answer in England, and therefore he ought to be very cautious in dealing with a case like this. Mr. Purcell, Q.C., stated that, in the English Court of Chancery, there was a suit pending against the bankrupt, as one of the defendants, in which the plaintiffs sought to recover £14,000, and, especially as against the bankrupt, a sum of £2,600. The bankrupt was then examined at some length by Mr. Seeds, and stated that he was partner in the bankrupt firm of Harper Twelvetees, Son, and Co., and was also connected with other firms. Mr. Harris contended that his lordship ought to pass the examination. The great bulk of the bankrupt's debts consisted of the £14,000,—only a contingent liability of his in conjunction with nine other directors of the General Exchange Bank, and depending on the result of a Chancery suit. Judge Miller suggested that the case should be brought into the English and not into the Irish court, and adjourned it till Friday, to give Mr. Harris an opportunity of considering whether he would adopt this course.

NOTES OF WORKS.

Messrs. Maguire and Son, ironmongers, are erecting, as additions to their premises, 10, Dawson-street, extensive factory and workshops in South Frederick-street and Dawson-lane, according to plans and under the directions of Mr. Joseph Maguire, architect, 116, Grafton-street.

A villa-house is now being finished for James Morrin, Esq., on the Temple-road, near the Miltown railway station. Mr. J. Maguire, architect; Mr. Fegan, builder.

Extensive alterations and additions are being made to the drug establishment of Messrs. Hoyte and Son, 17, Lower Sackville-street. Mr. Joseph Maguire, architect; Mr. George Carolin, contractor.

The premises, 2, Upper Sackville-street, are being rebuilt for Mr. John Meaze, merchant. Same architect and contractor.

Mr. James Henry has been declared the contractor for the new Municipal Buildings in Belfast, at a cost of £16,000. Mr. A. T. Jackson is the architect.

AN IMPERIAL INVENTOR.—Some years ago the Emperor of the French was astonished at the great space occupied by flour when packed in sacks in the usual manner, and imagined that it might be compressed into a much smaller bulk, and be thus rendered of easier transport. He at once authorised some experiments to be made on the subject, which resulted in the flour being submitted to powerful hydraulic pressure, and served to the various regiments in tin cases, not only occupying a very small bulk, but protecting the flour from the damp of the atmosphere, and so preventing it from becoming mouldy.

THE ASPECTS OF THE SCIENCE OF LIGHT AND COLOUR PRESENTED BY A STUDY OF THE OCULAR SPECTRA.*

THAT there were great colourists before any definite theory of light and colour was propounded, and that there have not been greater since, are, I think, facts sufficiently remarkable to deserve careful consideration. It is too often forgotten that æsthetic is not derived as physical science from the observation of external things, but of the relations of certain phenomena to our own conscious being. The aim of æsthetic science is to determine what our sympathies and antipathies, our approvals and disapprovals, should be—is to eliminate all that is perverted and prejudiced in feeling in order to discover the normal or true taste. If the knowledge of the harmony of colour could only be obtained like that of mechanics or chemistry, from extrinsic sources, an instinctive feeling for colour could not exist, for this knowledge would then have to be acquired by everyone from external observation and repeated trials. But this *instinctive feeling* we all know, does exist independently of any scientific training—the science of colour being, in fact, in all but its purely physical aspect, the science of that true instinctive feeling possessed by perfect visual organisation. Nevertheless, as it is a human privilege to think, men not only desire to possess the instinctive feeling for harmony and beauty, but also to know in what relations these inhere. Nor can there be effective art-teaching without this exact knowledge, for the teacher is, in a sense, a physician who has to prescribe for and cure morbid feeling, and to this end true taste is of very little use without perfect understanding. And we very properly conceive the ideal artist as endowed with both. But it will be perceived that the artist is not so entirely dependent on formal science as the mechanician; æsthetic science being, as we have said, founded upon the facts of our inner nature, which are recognised in some degree by everybody. And it may be well, before proceeding to elucidate this subject, to remind you that the sciences may be broadly divided into those of the external and internal natures—those which treat of the laws of the external world, and those which treat of the laws of our own inner being; and that the science of harmony in all the arts belongs to the latter division. There is a matter of scientific teaching very much neglected in this country, viz., that all our knowledge of the external world is merely subjective; that is to say, we do not know things absolutely in themselves, but mediately, and as they appear to us. Those who are untaught in this respect believe they are contemplating external objects absolutely, whereas they are only contemplating their own impressions—the phenomena or appearances, not the realities. The eye no more sees the incandescence of the gas yonder than the ear hears the vibrating string; what we call sound and light are merely the effects of a vibrating elastic medium, in the one case on the auditorium, in the other on the retina; the existence of the vibrating string or of the burning gas are only telegraphed to sense, to our ears and eyes by certain intermediate undulations. If we examined the string closely we should see, and if we touched it feel, that it was moving; if we touched the incandescent gas we should be burnt; and thus our knowledge of external things is only the sum of all these impressions upon or appearances to sense. We know very well, on reflection, that the gas light is not in immediate contact with the retina, or the vibrating string with the ear, yet it requires some power of abstraction to be convinced that what I have stated is the truth.

There are many people who suppose, when one talks in this way, that some new-fangled doctrine is being broached, instead of it being a statement of facts long recognised by thinkers. Here is a passage from a work a century and a-half old, but the doctrine I

have just enunciated is of more ancient date than the following quotation. It occurs in a work entitled "Sir Isaac Newton's Philosophy Explained for the use of the Ladies," translated by the Count Algarotti, and printed by Edward Cave, at St. John's Gate, 1739. "We ascribe," it says, "to bodies both light, colour, and taste, which in reality are only in ourselves." And again, "The vibrations which a sonorous body when it is struck raises in the air, and from thence in the auditory nerve, excite in us the idea of sound. In the same manner, the vibrations which a luminous body raises in the ethereal matter, and from thence in the optic nerve, excite in us the idea of light." And in a modern class book we read—"The vibrations of a fluid existing in all space, the ether, when of a certain rapidity, produce in the retina the sensation of a certain colour; when of a different degree of rapidity, that of another colour; these colours, or sensations, being modes of the reaction of the retina. The simultaneous impression of undulations of different rapidity upon the same points of the retina excites the sensation of white light. These same sensations of colours and light may, however, be produced without the agency of the vibrations of an ether, by mere irritation of the retina, by means of electricity or mechanical pressure." Light and colour, then, exist only in sense. This fact not only gives us one glimpse of why there were colourists before a science of colour existed, but forms a stand-point from which to contemplate the science of light and colour in a new aspect. The overbearing tendency to investigate external physics in this country, entirely diverts the attention of scientific men from this great truth, which I conceive will prove of the utmost importance in propounding the true and permanent theory of Light and Colour.

According to the Newtonian or Corpuscular hypothesis, particles were supposed to be thrown off from incandescent bodies, and to cause the different sensations of colour by their different velocities; by their united simultaneous action on the retina, the sensation of white light. But according to the Undulatory Theory, the various sensations of colour are caused by the different vibrations of an elastic medium in the same way that musical sounds are excited in the auditorium by the vibrations of the air, and the sensation of white light by the simultaneous action of all the colour-vibrations on the retina, as you may have gathered from the preceding quotation. It will be perceived that by neither hypothesis is it supposed that light and colour are properties of the rays themselves, but sensations excited by their action. It is, therefore, inconsistent with either hypothesis to talk of the different refrangibility of colours. The vibrations producing sounds and colours are simply vibrations of an elastic medium; it must be these, therefore, which are differently refrangible. And a question arises out of his consideration, whether it is reasonable to speak of vibrations being *absorbed* by certain bodies.

Seeing, then, that colour exists but in sense, we fathom the reason why there were great colourists before a science of colour was propounded; for it is clear the true science of harmony must in that case be derived from that inner instinctive feeling which enabled the old masters to work truly without a manual. It is very startling to persons who have not studied these subjects, even to painters and scientific men, sometimes to be told that pictures have no inherent colour, that they are mere different targets for the sun's rays, and that the coloured pictures exist only in their, and not other spectators' eyes, and that possibly they are not precisely the same coloured pictures to any two people. The perfectly organised eye, however, has all the elements from which the harmony of colours may be worked out independently of prismatic analysis, or book; indeed, a book is far too limited to give more than a few marked combinations of the possible harmonic relations of colours. I shall,

therefore, show how it is possible to obtain this experience of the harmony of colours, and, at the same time, point out the new aspects of the science of light and colour presented by the study of the ocular spectra. But in case there should be anyone among my audience who yet believes that colour has an objective and external existence independently of sense, I will bring forward facts which may prove more convincing than the reasons already adduced. It is a question, indeed, whether this idea of externality is not acquired; for the boy born blind, to whom Cheselden restored sight by operation, saw all objects as if they lay in one plane, although in him the ideas of the corporeal world obtained through the sense of touch were completely developed. It seemed to him as if the objects "touched his eyes, as what he felt did his skin." And if you reflect for a moment, the dimensions of the eye precludes the possibility of seeing other than very minute impressions, not the objects themselves. The whole expanse of landscape, sea, and heavens is depicted in the little camera lucida, the eye, in a field not more, perhaps, than three-quarters of an inch in diameter. You think you see the external realities, which, however, merely reflect into the eye the rays they have received from elsewhere. The sensations of light and colour, even, may be produced independently of any external rays whatever wherever aliquot parts of the retina are excited by any internal stimulus such as the blood, or by any external stimulus, such as mechanical pressure, electricity, &c. For instance, the luminous spectrum produced by pressing on one side of the closed eye; and if the pressure be made by means of a small body, such as, for example, the blunt point of any instrument, and the parts of the retina affected by it consequently of limited extent, the luminous image is also small. These images are not defined on account of the pressure on the eye-ball through the eyelids and the coats of the eye being diffused to a certain distance around the space which the pressing body itself would act upon. If, however, it were possible to confine the pressure accurately to determinate portions of the retina, we should doubtless be able to produce perfectly defined images by mechanical means—pressure on the brain has been frequently observed to cause the sensation of light.

(To be continued.)

THE VALUE OF PROMPTITUDE.

PROMPTITUDE is nowhere of more importance than in the garden. I have been reading with interest Mr. Clarke's remarks about a friend of his going express to London for tobacco-powder to save his peach-trees. This calls to mind an instance which came under my notice during the drought of last summer. I have a friend who happens to have one of the worst kitchen-gardens imaginable, if the weather happens to be dry. The soil is so light that it blows about in clouds in windy weather. We all know what a difficult matter it was to get a dish of juicy turnips in ordinary soils, much more in those composed chiefly of sand like this. Well, the ground was dug up nicely, the beds marked out, and everything got in readiness for the reception of the seed upon the advent of the first shower. At last the rain came, and the seed was sown, and in a few days afterwards the young plants were bristling over the beds as thickly as possible. The Sunday evening following a special excursion was made to see and admire this splendid breadth of turnips, when, lo and behold, the plants were attacked by thousands of that ruthless pest, the turnip-fly. What was to be done? To leave them alone until the morning was next to consigning them to destruction, and, therefore not to be thought of. Well, off came the coat, and in less than a quarter of an hour the whole of the bed received a good dressing of soot, which sent the fly to "the bourne from whence no traveller returns," and the plant was safe. I am quite aware that it was not more than what a sensible man ought

* By Cave Thomas, Esq.

to do, but let us take the other side of the question. There happen to be two kitchen-gardens here, but a considerable distance apart, and turnips were sown in both, and both beds had the same promising aspect. My friend took a different course with those in the field garden. He gave orders on the Monday morning for them to be dusted at once. Of course the man intended doing it, but thought there could be no particular hurry, and went on about the job he had in hand, and forgot all about it until the following day. What was the result? Why the crop was so far destroyed as not to be worth the trouble of dusting. There is nothing particular in this, or more than what every one connected with garden affairs ought to know. Nevertheless it is a forcible illustration of the value of doing what is necessary at the right moment. In this case it made just the difference between a good crop and no crop at all, with not one item more labour in either case. When I saw the crop the plants were just beginning to bulb, and were nearly as precious as gold-dust. I went into dozens of gardens after that in which not a turnip was to be seen, and more favourably situated too than the garden in which the above example occurred. "There had not been enough rain to get the seed up," or "the fly had taken them just as the plants came up," were the general complaints. It simply amounted to this: the digging and preparation of the ground was delayed until after the rains, and then the most surface-soil was buried, and the seed sown in the dry stuff turned up from the bottom; or the plants were allowed to be destroyed by the fly before the proper remedy was applied. If this example related merely to the raising of a crop of turnips, these remarks would not be worth the space they occupy; but how often do we see houses of plants ruined with fly, when half an hour and a few pounds of tobacco-paper will set everything right! I have seen many a crop of peaches and grapes totally destroyed, when one dusting of sulphur at the right moment would have saved it. The instances could be multiplied by the hundred in which promising crops of almost everything that comes within the gardener's care have been entirely lost for the want of half an hour's attention at the right time. I do not hold myself up as a paragon of perfection in this matter, and I am bound to confess that in my younger days I have had to mourn the loss of many a promising crop through want of attention. One of my great failings was to be continually putting things off until too late, but time has now taught me wisdom.—*Gardener's Mag.*

NEW DISCOVERY IN JERUSALEM.*

WE have, during the last few days, succeeded in driving a gallery up to the great block of masonry forming the north-east angle, and have found the wall to be built of great bevelled stones to a depth of at least 60 ft. below the surface, and we have not yet come on the rock.

In my last letter I expressed some diffidence about our being able to get across, on account of the treacherous nature of the soil, although we were then only 50 ft. off. By employing a different shape of gallery frame, and keeping a non-commissioned officer continually at the head of the gallery fixing them, we have been able to surmount these difficulties, and are now likely to make a great addition to our knowledge of the ancient topography. Already we have made a happy commencement.

We struck the Haram Wall about 18 ft. south of the north-east angle, and at a depth of about 32 ft. below the surface. We then turned north, and ran along the Haram Wall for 26 ft. without finding any angle similar to that above. At this point a slit about 18 in. wide and 4 in. high was observed in the Haram Wall, formed by cutting out parts of the upper and lower beds of two courses. A stone, dropped down this slit, rolled rattling away for several feet. It was some time be-

fore I could believe that we had really passed to the north of the north-east angle; but there can now be no doubt of it, and that the ancient wall below the surface runs several feet to the north of the north-east angle without break of any kind.

If the portions above ground are *in situ*, it would appear that this angle is a portion of an ancient tower reaching above the old city wall, probably somewhat similar to the view De Vogüé gives of it (Plate xvi., 'Le Temple de Jérusalem').

We have this morning examined the slit mentioned above. At first it was impossible to squeeze through, but after a few hours it became easier, though it is now only 7 in. in height. The passage in from this slit is difficult to describe: the roof falls by steps, but the floor is a very steep smooth incline, falling 12 ft. in 11½ ft., like the slit and shoot for letters at a post-office. The shoot ends abruptly, passing through the roof of a passage. This passage runs east and west; it is 3 ft. 9 in. high, and about 2 ft. wide; it runs nearly horizontally, and at its eastern end opens out through the Haram Wall. At the western end it goes (by measurement) to the east end of the Birket Israil, but is closed up by a perforated stone. This passage is 46 ft. (?) in length. On the south side of it, a little to the west of the shaft, is a staircase cut in the masonry, and running apparently to the surface, but it is jammed up with stones. The roof of the passage is about 48 ft. below the surface. The stones forming it are of great size, but do not show large in comparison with those of the sides, which are from 14 ft. to 18 ft. in length, and vary from 3 ft. 10 in. to 4 ft. 6 in. in height. To the west of the staircase the bottom of the passage slopes down rapidly, so that in one place it is 12 ft. in height. The roof also is stepped down 4 ft., at about 11 ft. from the western end. Altogether, this passage bears a great resemblance to that which we found under the Single Gate, in October, 1867.

At the eastern end, where the passage opens out through the Haram Wall, a rough masonry shaft has been built round, so that we can see a few feet up the wall, and about 7 ft. down it below the sole of the gallery. It is evident that here there has been some tinkering at a comparatively modern date.

In the course forming the sole of the passage there is a water-duct leading through the Haram Wall, about 5 in. square, very nicely cut; but in the next course, lower, a great irregular hole has been knocked out of the wall, so as to allow the water to pass through at a slightly lower level, and so run into an aqueduct 9 in. wide and 2 ft. high, which commences at this point, and runs nearly due east from the Haram Wall. All this botching and tinkering looks as if it had been done quite recently, and the workmen have left their mark on the wall in the shape of a Christian cross, of the type used by the early Christians, or during the Byzantine period.

At the further end of the passage, to the west, the same large, massive stones are seen until the eye rests upon a large perforated stone closing it up. This stone is the first approach we have yet found to any architectural remains about these old walls, (which I believe now are admitted to be of the time of the Kings of Judah,) and though it merely shows us the kind of labour bestowed upon a concealed overflow aqueduct, still, it has a bold and pleasing effect, and until something else is found, will hold its own as some indication of the style of building at an early period. It consists simply of a stone closing up the end of the passage, with a recess or alcove cut in it 4 in. deep. Within this recess are three cylindrical holes, 5½ in. in diameter, the lines joining their centre, forming the sides of an equilateral triangle (see sketch, plan and section). Below this appears once to have been a basin to collect the water; but whatever has been there, it has been violently removed. It appears to be probable that the troops defending this portion of the wall came down the staircase into this passage to obtain water. At first sight this passage appears to

be cut in the rock, as stalactites have formed all over it, and hang gracefully from every joint, giving the place a very picturesque appearance. It seems probable that we are here some 60 ft. above the rock. There can be little doubt that this is an ancient overflow from the Birket Israil, which could not at that time have risen above this height, about 235 ft. above the Mediterranean, or 25 ft. above the present bottom of the pool, and 60 ft. below the present top of the pool.

It is also apparent that the Birket Israil has been half full and overflowing during the Christian period, and that for some purpose or other the water was carried away by an aqueduct to the Kedron Valley. At the present day, when there is such a dearth of running water in Jerusalem, it is rather mistifying to find that within our era the Birket Israil has probably been constantly full up to a certain point, and flowing over.

It will be a great mistake now if we have to stop this work for want of funds. We have got over to this north-east angle with considerable trouble and at great risk, and it is highly probable that difficulties would be put in the way of a second excavation at this point. If the excavations are to continue, I am convinced it is essential that we should strain every nerve to get sufficient funds to complete this work.

CHARLES WARREN, R.A.

ADDISON'S WALK, BOTANIC GARDEN, GLASNEVIN.
(Formerly the seat of Tickell, his friend, and Under-Secretary for Ireland.)

If pensive to the rural shades I rove,
His shape o'ertakes me in the lonely grove;
Twas there of just and good he reasoned strong,
Cleared some great truth, or raised some serious song.
TICKELL.

These ivy-mantled, solemn yews,
Time-worn and cloister-arched, how oft—
When morn was glancing on their dews,
Or at fall of evening soft—
Held their mute fellowship with thee,
Whose amiable philosophy,
Usefully pleasing, keenly kind,
Informed, corrected, and refined!

Such was the rest he chose from all
State labours and solicitudes,
Retiring from the courtly hall
To the calm power of pensive woods,
Where his discriminating eyes
Enjoyed congenial fantasies,
Sharing the sly satiric laugh
Of moralizing Bickerstaff.*

Perhaps to *Wimble's* pliant rod
This brook had rippled—*Honeycomb*
Those sunnier alleys may have trod—
Yon Church have heard full many a tome
Of the grave *Chaplain's* ordered lore,
Went its plain populace to pour
Forth to the friendly shade of trees
Coeval with the *Coverleys*.†

What memories haunt these hallowed groves!
Fraternal Tickell's tenderness,
And Phillips, musing, as he roves,
On scenes of terror and distress.‡
Even Swift would oftentimes unbend
In converse with Godolphin's friend,
And less repellantly austere,
Forget his indignation here.§

For (not to fleeting themes confined)
A sylvan shade, an evening sky,
Moved the serene *Spectator's* mind
To thoughts of immortality.¶
He taught a dim-eyed age to hail
Bright visions beyond *Mirza's* vale,
And rolled reviving waters o'er
Lands that were barrenness before.¶

Airs of "the spacious firmament"
In these undying branches play.
Divine Imagination went
Along that "peaceful river's" way.
Haply the very soil we press
Mingled with those remembrances
That "raised a thankful song" to be
The descent of eternity.**

—*Ulster Gazette.*

* Addison was in Ireland when the *Taller* (under the name of Isaac Bickerstaff) was commenced by Steele, who had not apprised his friend of his design; but Addison soon discovered the author by the work, to which, on his return to England, he largely contributed.

† Characters in the *Spectator*, the originals of which Addison had doubtless observed in real life.

‡ Ambrose Phillips, member for the Borough of Armagh, and author of the *Distrest Mother*, a tragedy, in the success of which Addison took a lively interest, commending it in several *Spectators*.

§ Swift's respect for Addison survived their political separation. The words "ubi soeva indignatio cor nterius lacerare nequit" form part of Swift's epitaph dictated by himself.

¶ The papers in the *Spectator* on the immortality of the soul were suggested, as the author informs us, by an evening walk "in a wood near his friend's house."

¶ The Vision of *Mirza* was the precursor of a long train of allegories and eastern fables by Johnson, Hawksworth, and others, none of which approached the chastened elegance and touching solemnity of his prototype.

** Alluding to three favourite hymns of Addison.

* From the *Athenæum*.

NEW PATENTS.

CUTTING ROCK, STONE, &c.—Mr. Joseph Kellow, of Tremadoc, quarry engineer, has patented "Improvements in Machinery for Cutting Rock, Stone, and Minerals." He proposes to cut the rock, stone, and materials into steps and galleries, in order to facilitate the working of the same, and to avoid the necessity of cutting floors by blasting. The machinery carries worm drills or borers or rotating cutters for boring, drilling, or making incisions, and also chisel cutters or similar cutters. At the front end of the machine are a number of worm drills or boring cutters, consisting of threaded or wormed rods or shafts terminating in cutters, and preferably in spear heads or lance heads or angular cutters. Cutting heads may be used alternating with each other, one cutter having sharp lateral angles protruding at the sides next which the edge of the next cutting head is straight or does not protrude, and so on. The drilling cutters are mounted in such wise that one shall present its flat side to the surface to be cut, while the next presents its edge, and so on alternately. These drills or boring cutters fit at their inner ends into collars or sockets, whence they are readily removable when out of action. They are supported on a frame capable of being slidden to and fro in a stationary frame. Such sliding action is effected by a worm actuated from the main driving shaft. They are also supported on two stout shafts resting on the main framework. Rotary motion is imparted to them by small pinions or worm wheels on their inner shafts or ends, driven by a worm worked by gearing from a main driving shaft. When the drill cutters have acted, their sliding frame is drawn backward and they are removed, and the chisel cutter is brought into action. This cutter consists of a plate terminating in a number of chisel cutters at the cutting end, while the opposite edge is connected with brackets which embrace a worm shaft or rod, on which it traverses from side to side, being moved on the worm, and actuated by a handle or otherwise. When not in use, the chisel cutter, which is joined or hinged, is turned back out of the way. When required to act, it is turned forward. It is so shaped that it easily comes into position over a stop rest or block of wood or like material, so contrived as to protect the ends of the shafts and the collars or sockets when the worm drills or boring cutters are removed, and to make a smooth surface for a sliding tool used in the operation. At the back of the machine is a jointed bracket, carrying a weighted cutter or drill, which is rotated by cone pulleys, or the like, worked by the driving shaft, and which is turned to the four opposite angles so as to perforate or cut the ground, in order that the machine may be plugged or fastened thereto. The driving shaft may be worked by a handle or otherwise, and communicates motion by suitable gearing to the worm drills or boring cutters, and other working parts of the machinery.

ARTIFICIAL FUEL.—Messrs. Hoskold and Wheeler have patented "Improvements in the Manufacture of Artificial Fuel," which consist in preparing or manufacturing blocks to be used as fuel, with the intention that the same shall be fit and ready for immediate use, free from odour, not liable to spontaneous combustion, and burn with less smoke than arises from ordinary fuel, and also shall produce a more powerful heat at a cheaper rate than hitherto known. The process of manufacture is thus described by the patentees:—"We take small coal, coal dust, lime coal, slack, culm, or other bituminous substance, which we grind fine, and to this we add during the process of grinding 'coal shale clay,' and by preference we make choice of that particular shale which is always found associated with coal of every kind underground; this we intimately mix with the coal, dust, slack, or culm, and pass the same into a mixing pan, when to the substance mixed we add pulverized resin, a proportion of asphalt or compact natural bitumen, to which a vegetable glue is added, made in the following manner:—To fifty gallons of water we add five pounds avoirdupois of rice and five pounds avoirdupois of the glue or gluten extracted from Indian corn meal or maize, which when boiled for half an hour is fit for use. The above quantity in solution is used with the above ingredients, and when thoroughly mixed together in the mixing pan, the whole is caused to adhere and form a compact paste, and can then be moulded into blocks, which we do by pressing machinery, and under such a pressure that the blocks will become solid. The paste thus moulded into blocks is placed in a drying chamber, or vessel, in order to be desiccated, when it becomes in a short time so hard as to bear carriage to a considerable distance. The following is a table of the proportion of the ingredients we prefer to use, which will make a good strong fuel, capable of sustaining a high combustion, but we do not intend to limit ourselves to the precise proportions hereinbefore stated:—17½ cwt. avoirdupois of coal dust; 2½ cwt. avoirdupois of coal shale clay; 5lb. avoirdupois of rice; 5lb. avoirdupois of Indian meal or maize gluten; 5lb. avoirdupois of pulverized resin; 20lb. avoirdupois of asphalt."

MISCELLANEOUS.

LATCH-KEY OF ONE OF THE GATES OF DERRY.—An esteemed gentleman, belonging to one of the oldest and most respectable families in this district, has shown us a very interesting relic of Derry in the olden time. This was the latch-key of one of the gates of the city which existed in the time of the siege. Apart even from its historic interest, the key is a curiosity in its way. It is strongly and tastefully made, and, although rusty, is in excellent preservation. Its peculiarity—a peculiarity which we have not observed in any modern key—consists in this, that it is, in fact, two keys in one. On a stem, four-and-a-half inches long, and about three-quarters of an inch in thickness, there are two different keys, one at each end, and each turned in a different direction from the other. The wards are strong, well made, and of somewhat intricate construction, and differ, as we have indicated, in each key. The length of the heads of the keys is two inches and a quarter each. Whether these were used for different locks on different sides of the same door, or for different doors, we do not know. The middle part of the stem is ornamented with indented lines encircling it. When one key was used, the other at the opposite end of the stem served as a handle for turning it.—*Derry Guardian*.

At a late meeting of the Royal Hibernian Academy of Arts, Thomas A. Jones, R.H.A., was elected president in the place of Catterson Smith, R.H.A., resigned. Thomas Bridgford was elected treasurer, in the place of the late George F. Mulvany, R.H.A. John S. Butler, architect, and Charles Nicholls, were elected academicians.

GOVERNMENT BUILDINGS.—In committee of supply on a vote of £40,000 to complete the purchase of land and houses near the Downing-street site for public offices, Mr. Goldney urged the postponement of the vote until the plans and estimates were on the table of the House. The hon. member referred at some length to the history of the new buildings and schemes at and near Whitehall during the last ten or twelve years; and show that in 1857 a scheme almost identical to the present was wholly rejected by the House, it having been found to involve the expenditure of eleven or twelve millions of money. Unless they made some stand now they would embark in an expenditure which would be equal to that which took place upon the Abyssinian war. It appeared that every building, including St. Margaret's Church, was to be swept away, in order that a better view might be obtained of Westminster Abbey and that grand palace in which they were assembled. If the country was rich enough he might not object to such a work, but he could not forget that many of the taxpayers had quite enough difficulty in paying the demands now made upon them by the State. They did not want palaces, but offices sufficient for carrying on the public business of the country.—Mr. Layard said the object of this vote was to enable the Government to complete the quadrangle of the buildings only half of which had been erected, and was occupied by the Foreign and Indian Offices. They had also to purchase some additional ground, the taking of which had already been sanctioned by Parliament. He would have to introduce a bill for acquiring some other land in the same locality, and when he brought it forward he would enter into the necessary explanations. This vote involved a sum for buying a portion of the block of buildings between King-street and Parliament-street, which would be required for the site of the buildings already sanctioned. He admitted that the outlay upon the Foreign Office was a *scandalous expenditure*, and Mr. Scott's plan for the Home and the Colonial Offices had been subjected to a severe scrutiny which would prevent the repetition of such extravagance. After sundry remarks by various hon. members the vote was ultimately agreed to. The next vote, £32,000, for erecting the Home and Colonial Offices in Downing-street, was passed.

A contemporary architectural journal of short standing seeks to attract public favour by issuing the following new style announcement:—

"Grocers, provision merchants, oil and tallow merchants, and others, about to build, or to make alterations in their establishments, should not fail to buy 'The —,' and consult its pages. In order that they may get the best possible information on the subject. The advertisements alone are of great value to anyone building or making alterations."

WEATHER PREDICTIONS A FAILURE.—The lessons of the season, as we can now read them, are all worthy of our attention. The weather prophets promised us a hot summer, and they were supported, both in respect of self-confidence and public approbation, by the remarkably mild winter and almost tropical temperature of the first two months of the year. Where are they now? Enjoying the ignominy they deserve for their shallow reasoning and their ignorance of facts. It may be within possibility to forecast the season—to say that the coming winter is likely to be mild or severe, or neither; that the next summer will be peculiarly hot or cold, or wet and dry, or in no respect peculiar at all. But it will not be done by a process

of inferences from the phenomena of animal or vegetable life. A great store of berries cannot be trusted as a foreshadowing of a great frost, nor can the order of the leafing of the trees or the dates of the arrival of the birds be relied upon as a predication of the characteristics of the summer. All these phenomena are in some way or other effects, not predications; berries prove the past season was favourable for their production; they afford no indication of the future. In the same way it may be said that the phenomena of animal and vegetable life, generally speaking, are the consequences of influences past or passing; they are in no way prophetic—at all events, as regards the weather for any length of time to come.—*Gardener's Magazine*.

The borings for rock salt near Wylen, Switzerland, have given very favourable results. Near the Rhine a bed eighty feet in thickness has been found at a depth of 420 feet below the surface, and another fifty feet thick not far off. The salt is hard, pure, and of excellent quality.

The departure of the Bermuda Dock was recorded in our (*Broad Arrow*) intelligence columns last week. At the latest advices all was going well with the gigantic structure and her convoy, but her further progress will be watched with anxious interest, as it is the first time such a mass of iron has been sent over the sea in its entirety. We observe that Mr. Day, the eminent chromolithographer, has published a drawing in colours of this wonderful floating basin, which not only gives an accurate matter-of-fact representation of the structure, but makes an effective picture. The dock is represented at sea, off Sheerness, with the *Warrior* docked without the caissons. The followings particulars are borrowed from the letter-press description which accompanies the drawing. The dock measures 381 feet in length over all, by 123 feet in breadth (inside 83 feet), and 74 feet in depth. It is capable of lifting a vessel of 8,700 tons weight, which, added to the weight of the dock itself, makes a total displacement of 16,700 tons. The present season has been chosen for her voyage to the West Indies as being the one in which the finest weather and calmest water may be looked for.

GOLDSMITHS' WORK.—The progress of fine art manufacture in this branch of trade is strikingly exemplified in a little work published by J. W. Benson, of 25, Old Bond Street, and of the City Steam Factory, 58 and 60, Ludgate Hill. It is enriched and embellished with designs (by Italian, French, and English artists) of Brooches, Bracelets, Earrings, and other articles, suitable for personal wear, or Wedding, Birthday, or other presents, with their prices. Mr. Benson (who holds the appointment to H.R.H. the Prince of Wales) has also published a very interesting pamphlet on the Rise and Progress of Watch and Clock-making. These pamphlets are sent post free for two stamps each, and they cannot be too strongly recommended to those contemplating a purchase, especially to residents in the country or abroad, who are thus enabled to select any article they may require, and have it forwarded with perfect safety.

TENDERS.

For the erection of female schools and dormitories at the Cork Union Workhouse, Mr. Richard R. Brash, M.R.I.A., architect:—

Robert Walker	£3,750
Richard Longfield	3,575
Samuel Murphy	3,550
Patrick Barry*	3,510
D. O'Donoghue	3,425
W. B. Kenefick	4,256
Simon Kenefick	3,218

* Accepted.

TO CORRESPONDENTS.

T. F., Over Darwen, Lancashire.—We shall be glad to receive the sketches you allude to. The stamps in payment of subscription came to hand. It would be a matter of great moment to our exchequer and to the success of our journal if our subscribers generally would remit their amounts as promptly. Besides the penny stamp on every application for a trifling sum, a clerk's time is wasted, and this costs us money also. The *Grocer* of last Saturday pokes up its dilatory subscribers thus:—"When will that millennial age arrive when it will be a work of supererogation for us to remind our subscribers that their subscriptions are due? As the date is at present shrouded in uncertainty, we shall in the interim take the trouble to inform those subscribers whose accounts date from midsummer that their subscriptions are now due, and that, to save unnecessary bookkeeping and to simplify our accounts, we should be glad to receive an early remittance from them. This is particularly applicable to those subscribers who are in arrears, and who seem to have forgotten the old saying that short reckonings make long friends!"

T. S., Mullingar.—The books named in your letter can be had from Messrs. Spon, London. They are amongst the "Weale" Series.

E. B., Newry.—We can supply you with copies of numbers published in 1863. The price will be 6d. each, post paid.

All Communications respecting the IRISH BUILDER, should be addressed to Mr. PETER ROE, 42, Mabbot-street, to whom all payments for Subscriptions and Advertisements must be made.

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The Irish Builder.

VOL. XI.—No. 231.

The Telegraphs.

THE threatened monopoly of the telegraph system which forms a portion of the now matured Government scheme for the concentration of electric communication under imperial administration, is beginning to excite that deserved attention which we (*Investors' Guardian*), were the first, and have hitherto been the only one, to claim for it. We hold the principle of non-monopoly to be, under all circumstances, one of the utmost consequences to the well-doing of a community. It is as much a principle of the benevolent generalization or universal goodness of nature and therefore of political economy, as is free trade itself, of which, indeed, it forms a co-existent, constituent, and elementary portion. We gave a rough and ready example, in a recent article, of what would have followed from a Government monopoly of the press, by instancing the *London Gazette*; but our own Post-office—so much vaunted in its present management—affords even a more ready instance. The reduction of penny postage was forced upon it; the adoption of railway carriages, at first compulsory, is even now systematically resisted wherever possible. The power and readiness of railway conveyance for letters remains up to the present moment undeveloped by the General Post-office, which keep up the farce of morning and evening transmission and of mailguards, just as if there were coaches to be brought out and horses harnessed, and highway robbers to be shot down by stout fellows wearing scarlet coats and armed with blunderbusses. How is it that every railway train is not a letter-carrier? Why should the large towns be regarded otherwise than as suburbs to the Post-office metropolitan centre? As regards telegraphy, let us see how we stand. The profits of Electric Telegraphs are increasing—under the old system—at the rate of 20 per cent. per annum. This was acknowledged in the Commons. Had things been let alone, how long would it have been before the companies would have of themselves adopted the Belgian system of cheap charges, and so bettered their property? for the working of telegraphs is inexpensive in ratio—not increasing—but in a minor degree with the increase of business. Already telegraph charges have come down—almost generally, to a universal omnibus rate of one shilling per message—which would ere long have been sixpence. What is the first step the Post-office announce in their plan? They will raise the charge for messages, where it is already sixpence, to one shilling! That is the first advantage to the public! And upon this they ask us for a monopoly! Why? To secure the business. To secure it to whom? Shall the nation rob the public, or the public the nation? or the Post-office rob us all? For that is what it comes to really in the end. Is it not as if a man were to lose £10 to secure £5? No! If the Post-office desire to secure to itself a monopoly, let it do so by offering to us cheapness and extra security, extra facilities, and greater celerity. If individual companies will offer

us the same or better, what should hinder our availing ourselves of those advantages? Certainly we ought not ourselves to operate in a contrary direction to our own interests. There was no monopoly in the Royal Mail coaches of twenty-five years ago; but people travelled by them because they went faster and were better horsed and more carefully driven and guarded. That is all the monopoly the Post-office ought to require. For ourselves we suspect Government management of every kind, and would much prefer, in the public interest, to see the Post-office checked. Where is the halfpenny or farthing stamp on newspapers, by withholding which, in accordance with the change in the newspaper trade, the Post-office have lost the entire carriage of newspapers into the country? Where is the Ocean Penny Postage, by the ignorant delay of which half a million of revenue is lost to the country? Boast of it as they may—and a very small success will serve an exultant official as sufficient ground for a triumphant dance—the management of our General Post-office is behind the circumstances of the age and the requirements of our commerce, neglectful of means, ignorant of resources, incompetent to invention, opposed to discovery, and sedulous in nothing but resistance to improvement.

NOTES OF WORKS.

The Protestant Church, Newtownbarry, diocese of Ferns, was re-opened on the 14th ult. after considerable alterations and repairs. A chancel and robing room have been added. The interior has been much improved by the removal of the galleries, and the substitution of a handsome open timbered roof; open benches taking the place of the old square pews. An east window, of same design as that in the Memorial Church at Lucknow, has been supplied by a London firm. The works were carried out, under the supervision of the Ecclesiastical Commissioners' architects, by Mr. Fairecloth, of Carlow. The cost was about £900.

The tower and spire of Christ Church, Lurgan, have been completed. The tower, 90ft. in height, is of black whinstone; the spire, 82 ft. is of freestone from Scott's quarries, Dungannon. The contractor was Mr. Robert McConnell.

A new Wesleyan school-house is to be erected at University-road, Belfast, according to plans by Mr. J. A. Moneriff, architect.

At a meeting of the Board of Guardians of the Balrothery Union, held on the 26th ult., to consider tenders for remodelling the chapel of the workhouse, for taking down partially and reconstructing the ventilating towers, and for sundry other works, the board unanimously decided on accepting the estimate of Mr. Mathew Echlin, of Rush, builder, which, together with those of Messrs. Swallow and Thomas Conolly, of Drogheda, respectively, were the lowest of eight submitted in competition. Mr. J. J. Lyons, of 25, Westmoreland-street, is the architect to the board. The estimates displayed the usual discrepancies in figures, some of the parties being nearly double the amounts of the three lowest.

The question of restoring the spiral building and cross at New Ross was considered by the Town Commissioners at a late meeting. We understand that on getting information as to the style of cross which formerly stood there, and an estimate for a similar one, and the necessary repairs to the building, they will further consider the matter, and eventually, we hope, carry it out. The secretary of the "Historical and Archaeological Society" will, no doubt, be able to supply the needed information as to the cross.

TESTIMONIAL TO T. HEVEY, ESQ.

WITHIN the past week a deputation, on behalf of the subscribers, presented Mr. Hevey, at his residence in Belfast, with a very beautiful and valuable case of architectural instruments. The testimonial was received by Mr. Hevey with the greatest possible gratification, as an evidence of the cordial relations which exist between him and his professional friends in Dublin. On a silver plate is engraved, in Medieval characters, the inscription:—"Presented to T. Hevey, Esq., Architect, by a few Professional friends. Dublin, June, 1869."

CORRESPONDENCE.

[It is to be distinctly understood that although we give place to letters of correspondents, we do not subscribe editorially to the opinions or statements set forth in same.]

TO THE EDITOR OF THE IRISH BUILDER.

SIR,—In your "Notes of Works" in last issue you say, "Mr. Henry, builder, has been declared contractor for the new Municipal Offices, at a cost of £16,000." As this gives the impression that it was put to competition, it is well to explain that the only "declaration" in the matter is an arrangement between him, the author of the plans, and the Corporation, to do the work for £16,000. There have been no other tenders obtained.

A BUILDER.

OUR CORPORATION AND ITS OUTLAY.

TO THE EDITOR OF THE IRISH BUILDER.

SIR,—Might I enquire, through your really practical paper, how it is that our patriotic Corporation is so fond of employing strangers, and giving away all their work and money to those of other countries in place of their own native tradesmen and taxpayers, as I find on enquiry that they have no less than a London contractor pitching the streets with tar and shingling and passing it as asphalt, and it is no sooner put down than it disappears or has to be raised and replaced again and again. I am astonished those patriotic aldermen or town council would tolerate such an abuse, or even those officials who are responsible to them and the public for thus throwing away money. Why have they not encouraged those of their own citizens—men that we all know have been well tested, even in our own exhibitions, to create confidence in their work, and men who would, as they have always done, employ and instruct our own citizens—I mean the Messrs. M'Anaspie, the well-known artists that have brought out many new and novel works in your city. I am really astonished that those patriotic members do not reflect and even take pattern by the old corporation as well as by both England and Scotland, who was and is satisfied at their own countrymen's work. For everything in the way of outlay they require for the wear and tear of the city I hope, from this henceforward, you will impress on them and on the public to pledge every new member at the hustings to keep all the outlay at home, in place of enriching and encouraging other countries. I hope Councillor Sullivan will also henceforward open the columns of his two papers to impress upon the Corporation to adopt this policy, and if they do they will create an industrious and happy community.

A CITIZEN AND TAXPAYER.

The *Builder* has commenced the publication, in its columns, of woodcut portraits of "contemporary architects and promoters of architectural art." Those of Mr. T. L. Donaldson, and Sir Wm. Tite, F.R.S., M.P., have already appeared. Some of our subscribers may remember that an effort, having a similar object, was made by this journal also a few years since, and failed on somewhat the same grounds as experienced by our valued English senior.

TEETOTAL VERSUS ALCOHOL.

Dr. B. Abbott in a late number of the *Athenæum* gives the best definition of "teetotal" that has yet been offered. The Doctor also states that from his boyhood he has known the word as familiarly used and as readily understood as tip-top, &c. I can also bear the same testimony, but it is not sufficient to prove the derivation of the word. It is, however, a great mistake to say the word was "coined" in 1833. William Maginn, the Irish poet, uses the word in 1827. Michael Banim, author of 'Tales of the O'Hara Family,' &c., uses the word in 1831; and I can remember it since the year of the great cholera in Ireland in 1832. In short "teetotal" (as it is improperly spelt) like the parliamentary terms Tory and Whig, is of Irish origin! It is spelt in the dictionaries *Todail*, in composition *t-todail*, and means "entire destruction" (*vide* O'Reilly's Irish-English Dictionary). Having only seventeen letters in the Irish Alphabet some of the consonants are doubled in initials and finals, to give the word a stronger sound; the letters which can be written doubled are *c, f, l, n, p, r,* and *t*. When an initial letter is doubled a hyphen or aspirate is sometimes used: thus the word under discussion is properly spelt *t-total* from *t-todail*. When the people of Ireland had to adopt the English language they retained several words of their own language, as the Saxons did under similar circumstances, and as the Hindus did also when compelled to adopt the Mussulman language (the present Urdu or Hindustani) under the conqueror Tamerlane. Among the words of Irish thus retained, or Anglicized as they term it, is the word *t-total*, the *t* being sounded by a single impulse of the voice was adopted instead of the *d*, which requires an aspirate *h* to pronounce the word in Irish. There being no such letter in the Irish alphabet as *h*, the aspirate was dropped, the softer-sounding *t* adopted, and the word in its Anglicized form and meaning was used *trie-na heula* ("mixed up" with the English. Space will not allow me to go fully into the question here, but I think it is necessary to say that is only in the genitive case the double initial and hyphen are used, thus: Wages in Irish is spelt (Nom. case) *tuarasdal*; Gen. *t-tuarsdal*; so also, Nom. *todail* ("total"); Gen. *t-todail* ("teetotal," as spelt now-a-days). When the *d* and aspirate were dropped, and the word received into English *society* (language) the absolute-ness of its meaning was also dropped, so that instead of the Celtic or original meaning of the word "entire destruction" it is received in English as "entire," "whole," comprising all requisite in itself, &c. With regard to Alcohol, this is a compound noun derived from the Arabic words *Al* and *Kuhul*. *Al* is the name of a tree, the *Morinda citrifolia*, from which a very useful dye is produced; there is also a fine impalpable powder produced from it, which is an inseparable article in all Asiatic ladies' toilets; this, together with a collyrium-salve produced from the same tree, is called *Kuhul*, and being made from the *Al* tree is distinguished by the name of *al-kuhul*. Johnson, Shakespeare and Duncan Forbes in their respective Arabic, Persian and Hindustani dictionaries, admit that the chemical term "alcohol" is derived from *kuhal* (as above described); and Hooper in his Medical Dictionary assigns the why and wherefore of its being called alcohol thus: "The eastern women," he says, "pencil the margin of their eyelids with a powder very finely levigated; whence the term *alkohol* came to be applied to any very subtle powder, and to anything brought to the highest degree of tenuity, especially spirits of wine." There is an oriental classical work in the library of Fort William in Calcutta, written by Amir Khursu, the celebrated Persian poet, called 'Nakl char darwish ki' ('The tale of the Four Darwish'). It was written in the sixteenth century, and mention is made in this book of a highly intoxicating spirit called *warku al khiyal* (*kuhal* is sometimes spelt *khiyal*); this is the "strong drink," the *shakar* of our Bible. It is mixed with palm-wine,—*tari* ("toddy"), opium, &c. We can, therefore,

trace *alkuhul* as a spirit (and an evil spirit it is!) to at least the sixteenth century, when it was introduced into Europe under the name of *Aqua vitæ* (but was discovered in the twelfth century by an Arab alchemist). In what stage was chemistry in Europe in the sixteenth century? or what did the chemists know of alcohol? They only had it in bottles on their shelves as a medicine, called *aquavitæ*. The French called it *Eau de vie*, and the Irish found how to bring the "craythur" from the still, and called it *Uisgebaugh* ("water of life" also). Now with regard to this word *Al*, anent which people quote the Koran and a character in the 'Arabian Nights' as proofs. Those who know anything at all of Arabic, Arabs, or Mohammedans of any country, could find a better word than "Al-koran," or "Al-rashid," in the Mohammedan festival after Ramazan is over. The *Id*, or festival, is called *Al kurban* ("the festival of the sacrifice"), in commemoration of Abraham's sacrifice of the ram. Although *Al* is called in Arabic *harf i ta'rif* (the definite article) it is rarely used in colloquial language. In the languages of the East the definite article is substituted by the demonstrative propouns *yih* and *wuh* (this and that); the indefinite is substituted by the first numeral, as *ek mard* ("one man"). *Al* also means "family," "offspring," "progeny," &c., and is the most frequently used form of the word; thus Hussain, the son of Muhomed, and his descendants are called *Al i äbä*, as in Ireland, The O'Donoghue, The O'Connor Don, &c. If indeed "The O'Donoghue" is related to any of the *Al i äbä*, or family of the Prophet, we might perhaps on the strength of this Irish-Arabic affinity write Teetotal = Alcohol, as "H. F. H." reiterates. But as the Irish chieftain would indignantly ignore any connexion with the false prophet root or branch, so also must teetotalers ignore any affinity or "sign of equality" between "teetotal" and "alcohol," notwithstanding the great catalogue of ancient authors that has been quoted to prove the solidity of foundation to the *château en Espagne*, which a school-boy's breath would cause to vanish into thin air. With equal propriety we might write water = fire as teetotal = alcohol, although the aforesaid schoolboy would tell us that water causes the "entire destruction" of fire. If Richard Turner did not "coin" the word, he made a happy selection, if those who quote him would not give the word the appearance of a stuttering origin by spelling it "teetotal" instead of the way in which it ought to be spelt, *t-total*. There is not a word in the English language has such a prefix as *tee*! The word spelt *teetotum* has its origin from the same source as teetotal,—*totum*, "a child"; *t-totum* (tee-totum), "a child's toy." J. M. O'CALLAHAN, in *Athenæum*.

GREAT AMERICAN PEACE JUBILEE AT BOSTON.

THE *Builder* informs us that for the celebration of the "Great American Peace Jubilee at Boston," there was a grand chorus of 10,371 voices, 115 first violins, 100 second violins, 65 violincellos; an equivalent force of trombones, bassoons, drums, &c., and a grand chorus organ with 1,011 pipes and a wind pressure of 4,000 lbs. on the reservoir. Not satisfied with all this piping and fiddling, they added the music of 100 blacksmith's anvils! a park of artillery! and "all the bells of the city;" everything "under the control of the leader." The audiences for five days, during which all this was going on, were 50,000 to 60,000 people, inside a great building purposely erected, and a vast multitude outside. The originator of the grand idea was an Irishman.

Mr. Samuel Downing, jun., nephew to the Professor of Engineering in Trinity College, has been appointed Assistant Professor of Engineering in the Presidency College, Calcutta. The salary commences at £600 a-year. The late Assistant Professor, Mr. John Middleton Scott, has been promoted to the Professorship; salary £1,500 a-year. Messrs. Alfred Phelan and William Atkins have been appointed to places in the Public Works Department of India. All four gentlemen graduated in Trinity College Dublin.

REVIEW THIS.—The expenses incurred in connection with the Royal Naval review at Spithead in honour of the Sultan in July, 1867, as laid before the Committee of Public Accounts, amounted to £8,882 14s. 6d.

The Royal Architectural Museum building, Westminster, was inaugurated on the evening of the 21st ult. Mr. Beresford Hope, M.P., presided. The Queen has given £50, and Sir William Tite, M.P., a second donation of £100 to the building fund.

An important work is being completed at the Orleans railway terminus in Paris, namely, an iron roof over the passenger station. The station yard is 910 feet long, and more than 163 feet in width; the springing of the roof is 52 feet, and the ridge 91 feet above the ground. The total weight is 1,340 tons, the principals alone weighing 130 tons. The raising and fixing employed 300 cubic metres of timber, and 30 tons of ironwork.

GREAT FEAT OF A NEWSPAPER EDITOR.—The following anecdote is related of Mr. H. J. Raymond, of the *New York Times*, who recently dropped down dead in a fit of apoplexy:—Mr. Webster was to make an important speech in Boston, and Mr. Raymond went from New York to report it, taking with him not a corps of phonographists, but a corps of compositors with their cases of type. Taking down the speech of the great orator in "longhand"—for his quickness enabled him to give, in this way, a report almost as perfect as one in shorthand he returned the same evening to New York, wrote out his copy in a steamboat as fast as his printers could set it up, and issued it in an extra *Tribune* within an hour of his arrival.

THE ART OF ILLUMINATING.*

IN taking up the class of substances on which illumination, as applied to general decoration, may be best executed, we meet, firstly, with one occupying a somewhat intermediate position, viz., tracing-paper. I term its position intermediate, because it may be wrought upon in either oil or water colour; and because, when so wrought upon, it may be either mounted on paper or card, and so made to contribute to book or picture enrichment; or attached to walls or other surfaces, brought forward in oil colours, and be so enlisted in a general system of mural illumination. How this may best be done technically will be hereafter described; here I may notice only the use which may be made of this convenient material by many not sufficiently advanced in design or drawing to be able to invent or even copy correctly by free-hand, and yet desirous of embellishing some particular surface with decorative illumination. For instance, let it be desired to fill a panel of any given dimension with an illuminated inscription. Take a sheet of tracing paper the exact size, double it up in both directions, and the creases will give the vertical and horizontal guide lines for keeping the writing square and even; then set out the number of lines and spaces requisite for the inscription, fixing upon certain initial letters or alphabets for reproduction, from this work or any other of a similar kind, and making the height of the lines correspond therewith. Then lay the tracing over, and trace with pen, pencil, or brush, each letter in succession, taking care to get each letter into its proper place, in reference to the whole panel, to the letter last traced, and to the other letters remaining to be traced. When this is completed, trace on whatever ornaments may best fill up the open spaces and harmonise with the style of lettering. When the tracing is completed, with a steady hand pick in all the ground-tint, keeping it as even as possible, and heighten the letters or ornaments in any way that may be requisite to make them correspond with the models from which they may have been taken. By adopting this method of working, with care and neatness of hand very agreeable results may be obtained, without its being indispensable for the illuminator to be a skilful draughtsman. The tracing paper may be ultimately attached to its proper place, and finished off, as will be hereafter recommended; and if cleverly managed, it will be impossible to detect that that material has ever been employed.

* From "The Art of Illuminating, as Practised in Europe from the Earliest Times." By M. DIGBY WYATT. Published by Day and Son.

The special convenience of illuminating upon canvas is, that instead of the operator having to work either from a ladder or scaffold, or on a vertical or horizontal surface, he may do all that is necessary at an easel or on a table on *terra firma*. His work when completed may be cut out of the sheet of canvas on which it has been painted, and may be fastened to the wall, ceiling, or piece of furniture for the decoration of which it may have been intended. All that is essential with respect to the design which may be wrought upon it, is to take care that they are fitted for the situations they may be ultimately intended to occupy. Thus it must be obvious that it would be an entire waste of time to elaborate designs destined to be fixed many yards from the eye, as minutely as those which would be in immediate proximity to it. No branch of designing illuminated or other ornament requires greater experience to succeed in than the adjustment of the size of parts and patterns to the precise conditions of light, distance, foreshortening, &c., under which they are most likely to be viewed.

Illumination on plaster may be executed either in distemper, if the walls or ceilings have been coloured only, or in oil, if they have been brought forward in oil colours. The former is the most rapid but less durable process. Hence decoration is usually applied in oil to walls which are liable to be rubbed and brushed against, and in distemper to ceilings, which are, comparatively speaking, out of harm's way. Very pretty decorations on plaster may be executed by combining hand-worked illumination with diapered or other paper-hangings. Thus, for instance, taking one side of a room, say about eleven feet high, to the under side of the plaster cornice, mark off about a foot in depth on the wall from the bottom of the cornice, set out the width of the wall into three or more panels, dividing the panels by upright pilasters of the same width as the depth of the top border. At the height of about four feet from the ground mark off the top edge of another horizontal band, which make also one foot deep; continue on the lines of the pilasters to within six inches of the top of the skirting, and draw in a horizontal border, six inches high, running all round upon the top edge of the skirting; then paint, in a plain colour, a margin, three or four inches wide, all round the panels formed by the bands and pilasters, and let the paperhanger fill in the panels with any pretty diapered paper which may agree with the style and colour in which you desire to work your illumination. The side of your room will then present two horizontal lines—one next the cornice, and one at about dado-height—suitable for the reception of illuminated inscriptions. In setting these out, care must be taken to bring a capital letter into a line with the centre of each pilaster, so that a foliated ornament, descending from the upper inscription and ascending from the lower one, may meet and intertwine on the pilasters, forming panelled compartments for the introduction of subjects, if thought desirable.

It is by no means necessary for the sides of these pilasters, or the bounding lines of the bands containing inscriptions, to be kept straight; they may be varied at pleasure so long as they are kept symmetrical in corresponding parts, and uniformly filled up with foliage emanating from, or connected with, the illuminated letters. Agreeable results may be produced by variations of such arrangements as the one suggested. Frequently round doors, windows, fireplaces, &c., inscriptions may be executed with very good effect, either on label-scrolls, or simple borders, and with greater or less brilliancy of colour, according to the circumstances of the case. Often simplicity and quiet have greater charms than glitter or brilliancy; thus black and red, on a light-coloured ground, the most primitive combination in the history of writing, is always sure to produce an agreeable impression; blue, crimson, or morone on gold, or *vice versa*, are no less safe; black, white, and gold, counterchanged, can hardly

go wrong. But it is scarcely necessary to dwell upon these details, as the plates in this volume furnish admirable tests by which the student may at once recognise the effects produced by almost any combination of form and colour he may feel desirous to introduce.

Few amateurs will be likely to attempt illuminations upon plaster ceilings, owing to the great difficulty they will experience in working overhead with a steady hand. They will generally do wisely to execute the principal portions on paper, tracing paper, or canvas, to fasten them up, as will be hereafter directed, and to confine the decoration actually painted on the ceiling to a few panels, lines, or plain bands of colour, which may be readily executed by any clever house-painter or grainer, even if altogether ignorant of drawing and the art of design. The most beautiful illuminated ceiling of mediæval times I believe to be that of the celebrated Jacques Cœur's house, at Bourges, in France. It is vaulted, and each compartment contains inscribed labels held by floating angels. The white draperies of the angels are relieved on a delicate blue ground only, so that the stronger contrast of the black writing on the white labels gives a marked predominance to the inscriptions; which, being arranged symmetrically, produce in combination agreeable geometrical figures.

Most of the preceding remarks apply equally to stone, but in reference to that material there is one point specially to enforce, namely, the advisability of not covering the whole of the surface with paint. There is about all stone a peculiar granulation, and in many varieties a slight silicious sparkle, which it is always well to preserve as far as possible. Illuminate, by all means, inscriptions, panels, friezes, &c., colour occasionally the hollows of mouldings, and gild salient members sufficiently to carry the colour about the monument, whether it may be a fount, a pulpit, a tomb, a reredos, a staircase, a screen, or a doorway, and prevent the highly-illuminated portion from looking spotty and unsupported, but by no means apply paint all over. It is not necessary to produce a good effect; it destroys the surface and appearance of the stone, making it of no more worth than if it were plaster, and it clogs up all the fine arries and angles of the moulded work or carving. Wherever stained glass is inserted in stonework, the application of illumination, or at any rate of coloured diaper-work of an analogous nature, is almost an imperative necessity, in order to balance the appearance of chill and poverty given to the stonework by its contrast with the brilliant translucent tints of the painted glass. In illuminating stonework, it seldom answers to attempt to apply decoration executed on paper or canvas; it should in all cases (excepting when it is at a great distance from the eye) be done upon the stone itself. The only exception is one to which I shall allude in speaking of metal.

Slate, although from its portability and non-liability to change its shape under variations of temperature, a convenient material for filling panels, and forming slabs for attachment to walls, is not to be recommended to the amateur, owing to the difficulty he will experience in effecting a good and safe adhesion between his pigments and the surface of the slate. In what is called enamelled slate, an excellent attachment is secured by gradually and repeatedly raising the slate to a high temperature; but the process would be far too troublesome and expensive for practice by the great majority of amateurs.

Metal in thin sheets is liable only to the objection from which slate is free, namely, that it is difficult to keep its surface from undulation in changes of temperature. In all other respects, both zinc, copper, lead, and iron bind well with any oleaginous vehicle, and offer the great convenience that they may be cut out to any desired shape, and attached to any other kind of material by nails, screws, or even by strong cements such as marine glue. Zinc is, perhaps, the best of all, as it cuts more readily than copper or iron, and keeps its shape better than lead;

caro should, however, be taken to hang it from such points as shall allow it to freely contract and expand. If this is not attended to, its surface will never remain flat. It is a material particularly well adapted for cutting out in labels to surmount door and window arches, or to fill the arceding of churches and chapels, and to be illuminated with texts or other inscriptions. Very beautiful effects may be produced by combining illumination with the polished brasswork which is now so admirably manufactured by Messrs. Hardman, Hart, and others. Care should, however, be taken not to overdo any objects of this nature. Let the main lines of constructions always remain unpainted, so that there may be no question as to the substance in which the article is made, and restrict the application of coloured ornament or lettering to panels, and, generally speaking, to the least salient forms. Of course, where it can be afforded, enamelling offers the most legitimate mode of illuminating metal-work; and ere long it is to be hoped that the beautiful series of processes by means of which so much durable beauty of colour was conferred on Mediæval metal-work may be restored to their proper position in British industry, and popularised as they should, and, I believe, might readily be.

To woodwork, illumination may be made a most fitting embellishment; and the application of a very little art will speedily be found to raise the varnished deal cabinet or book-case far above the majority of our standard "institutions" in the way of heavy and expensive mahogany ones, in interest at least, if not in money value. Almost every article of furniture may thus be made, as it were, to speak and sympathise; for the return every decorated object makes to the decorator is always in direct proportion to the amount of life and thought he has put into his work.

It is a common saying that "what comes from the heart goes to the heart;" and in nothing does it hold good more than in the production of works of art of all kinds, including illumination, which, through its specially dealing with written characters, has so direct an access to the intellect and affections.

In all appeals the decorative artist can make to the brain through the eye, he has open to him two distinct channels of communication in making out the scheme of his ornamentation—the one by employing conventional forms, and the other by introducing representations of natural objects. In the former he usually eschews light, shade, and accidental effects altogether; and in the latter he aims at reproducing the aspect of the object he depicts as nearly as possible as it appears to him. Both modes have found favour in the eyes of the great illuminators of old, and by the best they have been frequently and successfully blended. Under the "conventional" series may be classed all productions dependent on either an Oriental or Hiberno-Saxon origin; among the "natural," the later, Netherlandish, Italian, and French illuminations may be grouped; and in a mixed style, the majority of the best book-decorations of the Mediæval period.

To be enabled to recognise intuitively how to blend or contrast, to adopt or avoid, these different modes of treatment, is given to but few, and is revealed to those few only after years of study and of practice. Rules may assist, but can never suffice to communicate the power; work of the most arduous kind, and persistent observation, can alone bestow it. Still, with good models upon which to base his variations, and good will, the amateur may do much, and will probably best succeed by recurring incessantly to Nature, and combining direct, or nearly direct, imitation of Nature with geometrical lines and masses of colour symmetrically disposed. To aid his footsteps in this direction, I know no more convenient councillor than Mr. Llewellyn Jewitt, whose historical introduction to his brother's "Manual of Illuminated and Missal Painting," published by Mr. Barnard, of Oxford-street, contains some just remarks upon the subject.

THE ASPECTS OF THE SCIENCE OF LIGHT AND COLOUR PRESENTED BY A STUDY OF THE OCULAR SPECTRA.

(Continued from page 172.)

THE sensations of the sense of vision—namely, colour, light, and darkness—are, as we have already seen, perceived independently of all external exciting cause. In the state of perfect freedom from excitement, the optic nerve has no other sensation but that of darkness. The excited condition of the nerve is manifested while the eye is closed by the appearance of light or luminous flashes, which are mere sensations of the nerve, and not owing to the presence of any matter of light. Everyone is aware how common it is to see bright colours while the eyes are closed, particularly in the morning, when the irritability of the nerves is considerable. These phenomena are very frequent in children. Through the sense of vision, therefore, we receive from external nature no impressions of light and colour which we may not also experience from internal excitement of our nerves; and it is evident that a person blind from infancy, in consequence of opacity of the transparent media of the eye, must have a perfect internal conception of light and colours, provided the retina and optic nerve be free from lesion. The prevalent notions with regard to the wonderful sensations supposed to be experienced by persons blind from birth, when their sight has been restored by operation, are exaggerated and incorrect. The elements of the sensation of vision—namely, the sensations of light, colour, and darkness—must have been previously as well known to such persons as to those of whom the sight has always been perfect. If, moreover, we imagine a man from his birth surrounded merely by external objects destitute of all variety of colour, so that he could never receive the impressions of colours from without, it is evident that the sense of vision might nevertheless have been no less perfect in him than in other men; for light and colours are innate endowments of his nature, and merely require a stimulus to render them manifest. The accumulation of blood in the capillary vessels of the optic nerve, as in congestion and inflammation, excites in the retina, while the eyes are closed, the sensation of light and luminous flashes; a narcotic substance introduced into the blood excites in the same nerve the appearance of luminous sparks before the eyes. The mechanical influence of a blow, concussion, or pressure, excites in the eye the sensation of light and colours. It is well known that by exerting pressure upon the eye, when the eyelids are closed, we can give rise to the appearance of a luminous circle. By more gentle preparation the appearance of colour may be produced, and one colour may be made to change to another. Children waking from sleep before daylight frequently amuse themselves with these phenomena. The light thus produced has no existence external to the optic nerve; it is merely a sensation excited in it. The preceding facts prove that the realm of light and colour lies in sense, and therefore that perfect visual organisation is the most perfect sensitive meter of what is harmonious; but there are yet further proofs that light and colour are merely sensations, which may be raised in the eye by either external or internal causes.

If you look at a bright light intently for some seconds, and then direct your eyes to the right or the left, the image will still appear at an equal distance, and external to the eye, but we very well know that there is nothing external; that the sensation exists for a time independently of the original cause, and that this is the very same impression we, but now, declared was either the gaslight or sun we saw. In precisely the same way we attribute externality to the ocular spectra which supervene sensations of light and colour—for instance, that of red by green. If the impression of a red spot be excited by some external means, a spectrum of a different colour, after a while, as you all know, will be perceived on moving the eye to the right or left. This

spectrum appears to be in the same plane, and at the same distance as the external spot; but we may easily convince ourselves that it is not there, and that it has no external existence whatever, by first interposing a sheet of paper at some intermediate distance, when the spectrum will be still visible—nay, we may close our eyes and shut out all external action, and a compensating image will still be seen. Again, if a piece of lighted string, or some object be whirled in a circle, it will form a ring of impressions, and this would not be the case if light and colour were properties of the external rays; but being a certain state of the nervous organisation, the sensations remain, though the exciting means be removed. After looking at the sun the dark spectrum, which appears when looking at a white surface, assumes different colours, passing from dark to light in the following order—black, blue, green, yellow, white; if, on the contrary, the eye be closed in perfect darkness after a similar act, the colours of the spectrum will succeed each other in an inverse order of white, yellow, orange, red, blue, violet, black. This is not only a sledge-hammer blow to the notion of the externality of light and colours, but has a most important bearing on the physical aspect of the theory of light and colour, for we see that the gradual decadence of an original exciting force upon the nerves assumes various sensations in its decay. But upon this point I shall have more to communicate on a future occasion, and will now proceed to a further exposition of why there were great colourists before a written science of light and colour existed.

We have shown that light and colour are sensations, and that the external means, the rays, which excite these sensations, are the different wave lengths and rapidity of the vibrations of an elastic medium, and that the sole difference in the external undulations is a *proportional difference*. Now we cannot talk long with any one interested in the subject under discussion without soon hearing those, at present, mystical words “complementary,” and “compensating,” frequently repeated. But as it must be already perceived that these “compensating” spectra, of which we hear so much, have no external existence whatever, the compensation of which they are the product must be something effected in the eye itself—some re-adjustment of a disturbed condition. What, then, is the intrinsic meaning of the word compensation in reference to colours? I will show you, first of all, what compensatory means in this sense by reference to numbers. Just cast your eyes over the following table in which the sum and the mean of each pair of outside figures is constant, those on the left being in excess of those on the right in defect of the mean:—

7	6	5
8	6	4
9	6	3
10	6	2
11	6	1
12	6	0

Then, if 6 represent the mean or state of equilibrium of the retina, if it be excited beyond that state to 7, its reaction will be proportionately below, as to 5; if lowered below its mean state to 5, its reaction will be to 7, and so on through the series; and by this process the balance of nature is re-established. This is the law of compensation, not only of our own nature, but of the phenomena of the entire solar system, in the perturbations of temperature, and the orbits, spaces and times of the planets themselves. And as this law of compensation forms an important feature in the science of colour, I will attempt a complete exposition of the subject, as it puts every man whose vision is not defective in possession of the means—means which, possibly, the great colourists were familiar with—which will enable him to ascertain for himself the true harmonic of any colour, any pigment, better than any system of diagrams; and independently of any reference to prismatic analysis. Diagrams are, of course, useful as a *limited* means of teaching; but as every difference of colour, hue, &c., lighter or darker than a mean surrounding state, has

its special compensating reactionary sensation, diagrams cannot, of course, produce the infinite variety of possible experiences.

The first point determined was that light and colour are sensations; the second the general theory of the ocular spectra—viz., that if the retina be disturbed by exciting causes producing the sensations of light and colours, these are followed by reactionary sensations—spectra of an opposite kind. If two contiguous portions of the retina be unequally excited, as when we experience a black or dark-coloured spot in a white or grey field, this spot will have a bright colourless, or coloured compensating spectrum; if a white spot, or light colour in a darker field, a dark compensating spectrum. The ocular spectra are not peculiar to colours; they may be divided into three classes. They are either colourless spectra left by colourless images, or coloured spectra after colourless images, or coloured spectra after coloured images.

1. *Colourless Spectra left by Colourless Images of Real Objects.*—The duration of the sensations of the retina is much longer than that of the impressions which produce them. According to Plateau the sensation persists 0.32 to 0.35 of a second after the impression has ceased; and the duration of the “after sensation,” or “spectrum,” is greater in a direct ratio with the duration of the impression which caused it. Hence the image of a bright light, as the panes of a window through which the light is shining, may be perceived in the retina for a considerable period, if we have previously kept our eye upon the object for some time. The duration of these images in the closed eyes may also be very much prolonged by passing the hand up and down before them, so as to permit the light to fall upon them only at intervals.

The impressions of light and dark remain for some moments in their original relation to the retina, as when the exciting cause was present, though the eyes be closed, and all external radiation be cut off; but after a while the reaction sets in, and the relations of the spectra are reversed, what was at first light becomes dark, and that which was previously dark, light. After looking steadfastly for some time towards the skylight of my studio, I not only experience what I have just described, but a succession of coloured spectra, of which more anon. This reversal of light and dark also occurs if the eye be open, but turned towards a white wall, or sheet of white paper. The usual explanation given is this: The part of the retina which has received the luminous image is in an unexcited and, therefore, much more excitable condition. If the eye be directed in this condition towards a white surface, the rays from this surface produce upon the excited parts of the retina a much more feeble impression than upon the other parts which are as yet unexcited, and therefore more susceptible of their action. Hence the parts of the retina which were first dark receive a much more intense impression from the reflecting surface than those which were before light; and hence the inversion of the light and dark parts of the image in the spectrum thus seen. But we have learned that this inversion takes place without any external aid whatever. The usual explanation, therefore, requires thorough reconsideration and correction.

The coloured shadows, however, are usually ascribed to the physiological principle of contrast, the complementary shadows being regarded as the effect of internal causes acting upon that part of the retina, and not of the impression of rays from without. An argument in favour of this view is the fact observed by Count Rumford, that the colour of the shadow does not appear different from that of an ordinary shadow when viewed through a tube so as to exclude the view of the surrounding ground. Great probability is also conferred upon this explanation of the phenomena, by its analogy with the facts recently adduced, those in which a small grey strip of paper on the surface of a bright colour produces a complementary spectrum. In the case of the coloured shadows the experiment suggested by Von Münchow is complicated

with many deceptive circumstances; but in that of the experiment just alluded to the phenomena is reduced to its simplest conditions. There is, moreover, another important experimental proof of this view—viz., that if a piece of red glass be held up between the eye and the window the frame will appear to be green; now this sensation of green cannot be derived from the rays reflected from the window sashes, for the compensating green is just that which would be neutralised by passing through the glass, the image or shadow of the window frames in the retina, therefore, must appear green in contrast with the other portions of the retina experiencing the sensation of red. But as all we have described may be experienced by the perfectly organised sense, every one so endowed has the science of the harmony of colours within himself, and the great colourists of the past without being aware of it, worked according to this science in following the instinctive feeling within them. The colour of a picture depends upon the skilful combination of harmonic colours, or the prevention or solution of the disharmonies. The application of this principle has been carried so far as the imitation of the coloured shadows. By employing principally dull grey colours, a practice not unknown to modern painters, the danger of disharmonies is avoided by an even tone, but the more sprightly effect arising from the harmonic combinations of colours in these renounced. But the colouring of a picture is not always a matter of choice, for the painter has not only to consider the harmony of colour in the abstract, but the kind of colour which will be in harmony with his subject; a painter who should forget this would neglect the most important consideration, though his picture might in itself be harmonious according to the formal science. But I think the necessity for such a consistency between colour and subject would not be neglected by the perfect organization or sensibility, and hope, therefore, that I have now succeeded in showing why there were great colourists before a science of colour was enunciated. It now only remains to us to glance at the physical aspects of the theory of light and colour as obtained from the standpoint of this lecture. We know, according to the received physical theory, accepted in its integrity, that external to sense there are only modifications of one and the same elastic medium, that the external rays which excite the sensations of colours are only proportionally different. It is very difficult indeed to keep this theory in its absolute integrity before us, for our erroneous impressions are constantly overriding our convictions. The study of the ocular spectra favours the generally received fundamental physical theory, though not, I think, its entire superstructure; but how in this case can scientific men talk of the “*absorption* of one colour,” and “the reflecting of another,” when it is clear there cannot be any external colours to absorb or reflect? Force can only be reflected, refracted, diffused, &c., not absorbed. We might as reasonably speak of a musical string absorbing all the notes of the common chord but that which its vibrations, communicated to the air, cause in the ear. But it is from the study of that succession of sensations of colour arising from the decadence of one original sensation, in those experiments to which I directed your attention, from which we may expect the most important issues to the future physical theory of light and colour. But on this I hope to be permitted to dilate on some future occasion.

HISTORICAL AND ARCHÆOLOGICAL ASSOCIATION OF IRELAND.

The Association held their July Meeting on Wednesday, 21st ult., in their apartments at Butler House, Kilkenny, the Rev. Charles A. Vignoles in the chair.

The following were elected as members:—His Excellency the Right Hon. Earl Spencer, K.G.; the Rev. J. L. Darby; G. Hely, Esq., J.P.; P. Kennedy, Esq.; J. S. Holden, Esq.,

M.D.; Right Rev. Dr. Furlong; T. Clarke, Esq.; M. D. Keatinge, Esq., J.P.; Rev. Rd. R. Carey; Rev. William Healy; Edwin A. Eyre, Esq.; Rev. Waller de Montmorency; J. Paul Rylands, Esq.; J. F. O’Boyle, Esq.

The Rev. J. Graves, hon. sec., laid before the meeting a letter which he had received from Mr. Layard. Mr. Graves said that that gentleman, having given some indication, in the House of Commons, of a disposition towards the formation of a Government Department of National Antiquities, so far as England was concerned, he (Mr. Graves) had written to him, on the part of this Association, pressing the claims of Ireland to be taken into consideration in any arrangement of the kind. The following was the reply:—

Office of Works, 12, Whitehall Place, S.W.,
April 24th, 1869.

SIR,—I regret that, owing to constant demands upon my time, I have been unable to send you an earlier answer to your letter of the 15th April. You will have seen by an answer which I gave to Mr. Agar Ellis, on the subject of Irish historical monuments, in the House of Commons, that the Office of Works has no jurisdiction in Ireland, but that the Irish Board of Works is under the Treasury. Such being the case, I am unable to take any steps in the direction that you point out. I am entirely of opinion that historical remains of interest and importance should be carefully preserved. They form a part of a nation’s history, and should be national property. If at any time hereafter it should be in my power to take any steps towards their preservation in Ireland, I will do my best to have them placed under proper care; and I should be most happy to avail myself of the assistance and advice of gentlemen like yourself interested in these matters, and of the Society with which you are connected.

A. H. LAYARD.

The members present expressed approval of the step taken by Mr. Graves, and considered the reply received so far satisfactory, as showing Mr. Layard to be favourably disposed in the matter.

A scheme, suggested by Mr. G. M. Atkinson, for arranging that objects of antiquarian interest may be deposited in the Association’s Museum, for sale, by the owners or finders, was brought under the consideration of the meeting; and the rules proposed by Mr. Atkinson to be laid down for that purpose, were adopted, with some slight modification.

THE TOWER OF ST. FRANCIS’ ABBEY.

Mr. Graves observed that it would be time, before the season became more advanced, to renew the works for preventing the fall of the belfry tower of St. Francis’ abbey. They had expended nearly all the amount of the subscriptions received last year, in placing the cast-iron props under the south side of the arch, leaving the reparation of the haunches of the tower to be done. The Corporation, on the motion of Mr. Kenealy, had voted £10 towards the object, and it was to be hoped that the local public would subscribe the balance necessary. About £25 might perhaps do all that was necessary as regarded the preserving of the tower; but if a few pounds more could be obtained, there was now an opportunity of having the choir windows and the sedilia opened, which would be a most beautiful thing. Mr. Hayes, the proprietor, was quite satisfied to allow them to do this, and give up the use of the old choir as a racket-court; he had even intimated that he would lay down a smooth green turf, with flower-beds, in place of the present flooring, and do all in his power to keep the place in suitable order. It was to be hoped the means of having so great an improvement effected would be forthcoming through a local subscription.

PRESENTATIONS TO THE LIBRARY.

A number of books, principally publications of kindred societies, presented to the Museum, were laid upon the table. Amongst the books presented by the authors, were the Rev. C. P. Meehan’s History of the Franciscan Monasteries of Ireland, and Mr. P. Kennedy’s “Banks of the Boro,” the latter of which, although in the form of a tale of peasant life, Mr. Graves pointed out, affords a highly graphic and interesting picture of manners, customs, and observances now

grown obsolete in the district of the County of Wexford to which it refers.

PRESENTATIONS TO THE MUSEUM.

Mr. Blake, Ballynamona, presented the iron head of an ancient battleaxe, such as the Irish Galloglasses are stated to have been armed with. It had been dug up in a field near Mr. Blake’s residence.

Mr. Graves presented an encaustic flooring tile from St. Francis’ Abbey.

The chairman presented a shilling of William III., found at Clonmacnoise.

Mr. Richard Pierce, Stonyford, presented a silver coin of Edward IV., found at Stonyford.

Mr. E. Kelly presented a halfpenny of William and Mary, dated 1693.

Rev. C. L. Darby, Gowran Rectory, presented a photograph of an ancient carved stone, standing in a field near Stockpool Court, Pembrokeshire, and which had been sent to him by Rev. E. S. Cambell, in order that, if possible, some information might be obtained respecting the name “Euidon,” which was plainly carved upon it in the midst of interlacing sculptures of the character of the ornamentation of the old Irish crosses.

ANCIENT IRISH BELL.

Mr. Graves said the most interesting presentation and a most valuable one, was an ancient bell, found at Foulks-court, which Mr. Hely was kind enough to deposit in the museum for the present. As would be seen, it was of the most antique shape, formed of iron, riveted up the sides, and subsequently dipped in molten bronze to render it more sonorous. The tongue, unfortunately, had not been found. The finding of this interesting relic had been referred to at their last meeting, and in reply to a letter which he had, in consequence, sent to Mr. Hely, that gentleman wrote:—

“I shall be most happy to send you the bell, and also to allow it to remain for some time in the museum of this Society at Kilkenny as suggested by Mr. Prim at the last meeting, should it be thought worth a place there. The bell was found by some workmen whom I employed in enlarging a fish pond at Foulks-court, at the depth of two feet six inches from the surface, eighteen inches being bog-mould, and a foot sand. In the exact spot in which the bell lay, there is now a fine well rushing up. On the rising ground over the fish-pond, and at a distance of about two hundred yards, are the ruins of an old church, of the same age as Foulks-court castle, (about 1400), which is a very short distance from it. There is also a very fine round tower and moat at Fertagh, distant about a mile and a quarter, where a tradition still remains that the bell of the round tower, and other valuables were thrown into wells at Fertagh moor, at the time of Cromwell’s invasion, but could never afterwards be found. The belief here is that this is the bell of the old church of Foulks-court, and may have been hid at the same time and in a similar manner as those at Fertagh.”

A special vote of thanks was given to Mr. Hely for permitting the bell to be deposited in the museum.

Mr. Graves, as serving to illustrate the subject on which they were at the moment, exhibited a portion of an ancient Irish bell-shrine, which belonged to Mr. R. Day, jun., Cork, and which that gentleman was having engraved for the Association’s “Journal.” It was the portion of the shrine which had covered the bell-handle, and was of bronze, characteristically ornamented, and which had showed signs of having been richly gilt, and inlaid with white metal. There was also an Irish inscription, which yet remained to be fully deciphered.

ANCIENT CARVING.

Mr. J. Hogan, on the part of the Rev. Mr. Hart, P.P., Freshford, presented a portion of an ancient carving in alabaster, the remaining subject being a representation of a human face, the hair being curiously arranged in scallops, surrounded by several figures apparently of saints and angles, in attitudes of adoration—St. Patrick clearly recognizable amongst the former. The Rev. Mr. Hart—who was anxious for the safe keeping of this piece of sculpture in the locality, and for that purpose wished to deposit it in the museum

—knew nothing more of it than that it had come to him from his predecessor, and it was supposed to have been handed down from parish priest to parish priest of Freshford for centuries. The impression locally was that it was connected with the old parish church, and with its patron saint, Lactan, whose head might possibly be intended to be represented in the central figure.

Mr. Prim suggested that this was the upper portion of a piece of sculpture, which when completed had represented the Trinity, the head being intended to represent God the Father; the portions on which the other two persons of the Trinity had been typified having been broken away and lost. It seemed older, or at least ruder in execution, than the representation of the Trinity, also carved in alabaster, preserved at the Black Abbey.

OGHAM INSCRIPTIONS.

Mr. R. R. Brash, Cork, wrote, stating that, being recently in Tramore, he had from thence visited some of the Ogham monuments of the district. He had gone to Temple-Enoch, in quest of an Ogham described as being there, by Mr. W. R. Blackett, in the "Transactions of the Kilkenny Archaeological Society" for 1861 (page 8), but he regretted to say that he had been quite unsuccessful in his search, although having made a careful scrutiny both inside and outside the fence. He fell in with the owner of the land, and described the stone to him, but the man stated that he had never seen it, or anything like it. From Mr. Blackett's description it undoubtedly was an Ogham, and its disappearance was therefore to be much regretted.

Mr. Prim read a letter which he had received the previous day from Mr. W. Williams, Dungarvan, in which the writer mentioned that he had forwarded by an earlier post the same day a paper to be read at this meeting, in connexion with the Ogham inscriptions at Ardmore. The paper, however, had not yet come to hand—it was to be hoped that it had not been lost in the postal transit. The letter stated, as regards the Ardmore inscriptions, "Two of them I have identified as the burial monuments of two old chiefs or kings of the Decies—namely, Anae and Lugad, father and son, and the latter St. Declan's great grandfather. This should settle the vexed question of the age of Ogham writing; and, if so, it may be considered an important discovery. I shall be glad if the paper meets the approbation of the Association."

MODERN IRISH INSCRIPTION.

Rev. G. H. Reade, Inniskeen, sent a rubbing of a modern Irish inscription on a tombstone in Louth churchyard. It was a small headstone; at top was the sacred monogram I.H.S., surmounted by a cross, and a star at either side, and beneath four lines in Irish letters, reading—

Суагннеар рісеад табарн до а чїзеарна, О, а дїа. Соїлре цїрста деабїаїа.

"Peaceable rest giveth him, O Lord. Certain brightness, effulgence (shew) to him, O God."

It was curious enough that no name was given in the inscription.

Amongst other papers were the following:—"On Irish Fibulae," by Mr. Hodder M. Westropp (with illustration).

Notice of "The Nine-hole-stone," in the Melchans, near Tullamore, by Mr. Thomas Stanley.

"Report on the Condition of the Ancient Remains on the Islands off the Coast of Connemara (all found to be in a very deplorable state)," by Mr. G. H. Kinahan, M.R.I.A., Honorary Provincial Secretary to this Association for Connaught.

"Account of a Tumulus and its Contents, at Topping, Parish of Inver, Co. Antrim, with Illustrative sketches of Standing Stones and the Ornamentation of the Urns found in the Excavation," by J. S. Holden, Esq., M.D., Glenarm.

"On the Banners and Badges of Ireland (intended to prove that the Royal Standard of England is of Irish origin)," by Mr. E. Fitzgerald, Youghal.

Thanks having been voted to donors and exhibitors, the Association adjourned till the first Wednesday in January.

GRAND HIGH ALTAR, PARISH CHURCH OF LATTEN, COUNTY TIPPERARY.

The altar and reredos, illustrated in our present number, are made in Caen stone, Irish and Italian marbles. The altar-table is one slab of Sicilian marble, supported by Galway green marble shafts, with beautifully carved capitals and bases, having a deep sunk string cornice, filled with carved pateræ and roses. In the centre space under the altar-table, is sculptured the figure of the Dead Christ and the Blessed Virgin leaning over the body of her divine Son in an attitude of the deepest sorrow. On either end space between the columns, is placed a figure of an angel weeping. The effect of the arrangement is most happy and singularly striking. Upon the altar, in the centre, is placed the tabernacle, backed up by the lesser reredos. The tabernacle is made of Caen stone, with inlaid marble in small panels on each jamb, flanked by an angel in a kneeling position, the wings forming an arch over the door of the tabernacle. There are plates of brass, beaten and engraved, and pricked in with enamel colours. In the tympanum, over the door, is carved the pelican feeding her young. The lower reredos is raised sufficiently high to act as a screen to a passage leading from the sacristy, which is immediately behind the tabernacle. The throne is placed backward, in line with the lower reredos. The panels in this portion of the work are most elaborately carved and pierced, and backed by a slab of polished Galway black marble. A cornice surmounts these panels, and provision is made upon it for the second row of candlesticks and flower vases to stand upon.

The reredos is very superb. The lower panels up to the first string course are filled with the richest carved foliage, as is also the cornice. Above this line come four deeply recessed niches, each covered by a rich carved and crocketed canopy, supported by Cork red marble shafts. In the spaces between the gablets stands an angel with outstretched wings. In the centre stands the throne for the blessed Sacrament, rising 21 ft. 6 in. from the floor. There are four groups in the reredos. The first, on the gospel side, the Annunciation; second, the Nativity; third, the Flight into Egypt; fourth, the Coronation of the Blessed Virgin. The groups are remarkably fine, and the composition is faultless.

The whole of the work was designed by Mr. John Earley, and executed by Messrs. Earley and Powells, Camden-street Works, Dublin. The cost of the work was £500.

HOLYWOOD CATHOLIC CHURCH COMPETITION.

As we stated in our last number, Mr. Hevey has been declared the successful competitor for the new Catholic Church at Holywood.

The second place has been awarded to a design by Messrs. Sherrie and Hughes. The plan of the adopted design is a wide, well-proportioned nave, terminated at the eastern end by a chancel and two side chapels, which are separated from nave by a large and two smaller arches, one at either side. The chancel is some 16 ft. less in width than the nave (which is 36 ft.) and the difference is made up by the side chapels; as, the site being very contracted in width, it was not considered desirable to have any projecting building beyond the line of nave walls.

The west end presents a fine elevation. There are two towers at the south-west angle, a large tower and spire reaching to the height of about 125 ft., and at the north-west angle

a smaller one, containing staircase to organ gallery, (there is a separate external entrance to this tower, so that parties can have access to the organ-chamber without communication with any other portion of the church). Between these towers, and recessed back from their frontage line, rises the west wall of nave, pierced by a rose window. The space thus left between the west wall and front line of towers is occupied by an open porch, forming with these towers a straight frontage line.

This porch has two large arches with a canopied niche over the pier between them for a statue, and is roofed with a lean-to roof against west wall, finished at the eaves with a rich pierced parapet and cornice, &c. The nave is divided into six bays by internal piers and arches projecting from the inner faces of walls. Each bay is lighted by two lancet windows, with a circle filled with varied tracery over.

The roof of nave is open-timbered, sheeted with pine sheeting, laid diagonally. The principals of roof are wrought, moulded and curved, and carried on carved corbels at each pier. The roof of chancel has curved ribs, and is divided into panels by moulded ribs. The altar platform will stand the height of five steps over nave floor. Internally the church will be lined with brick, with, occasionally, stone in arches, shafts, &c. The cost of the church will be about £4,000, and it will seat about 500 persons. The mouldings, &c. throughout the church will be of a plain bold type—simplicity of form, and justness of proportion being the chief characteristics of the design.

We congratulate Mr. Hevey on his success, which is the more creditable to him from the number and well-known abilities of some of his opponents in the competition.

"THE DICTIONARY OF ARCHITECTURE."

SIR,—The "Dictionary of Architecture" is a work so important and valuable that I hope you will not object to invite the attention of the profession, as well as of the public generally, to the proposal recently made by the Society to secure its early completion.

If within the next week I am favoured with a sufficient number of replies to the circulars which have been issued, the committee anticipates that the complete work—A—Z—can be supplied for fifteen guineas, a very moderate sum considering the magnitude and importance of the work.

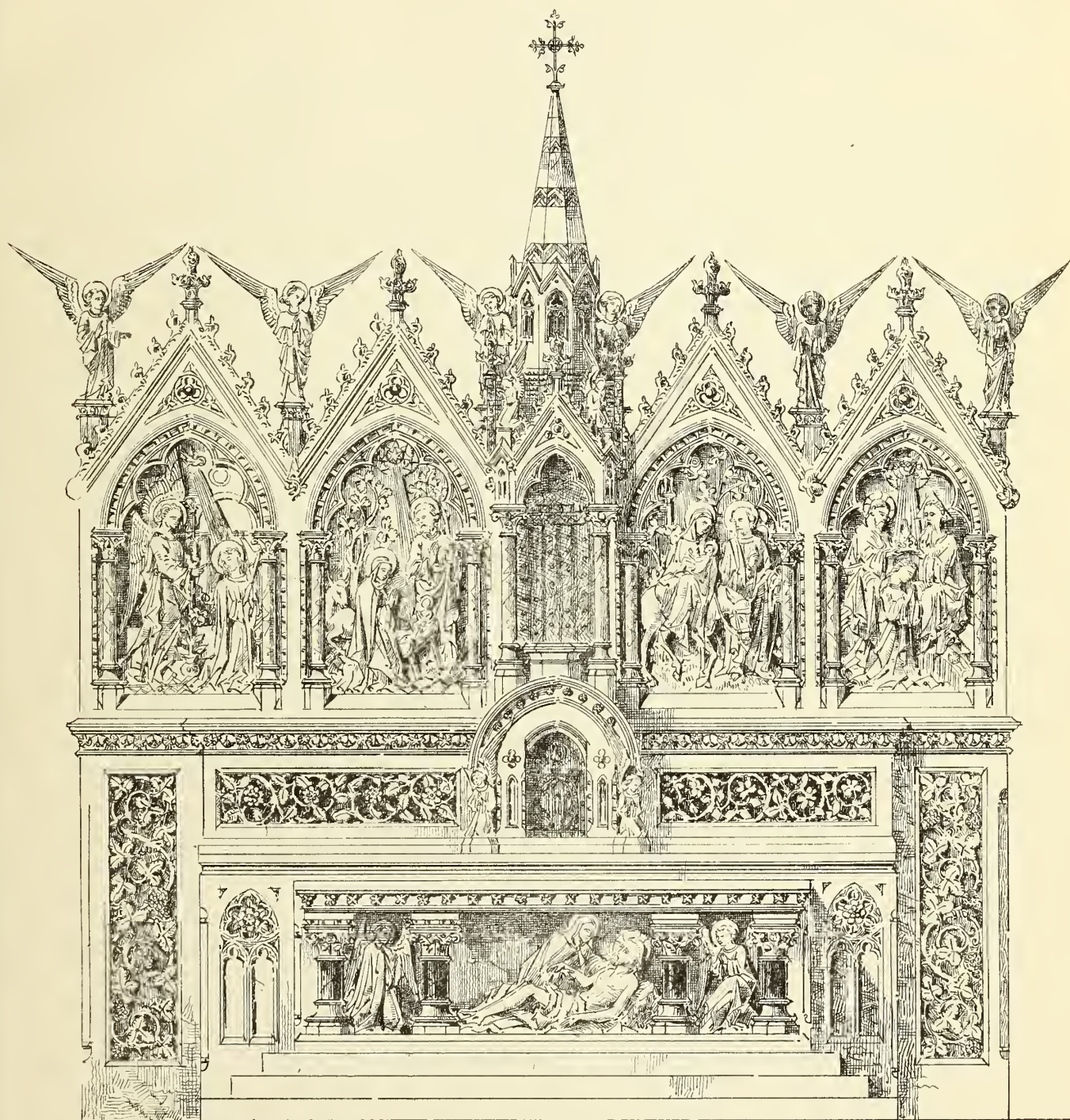
It is quite possible that many persons who would desire to possess the work, may hold back in the hope of being able at a future time to secure it at a less price (by the sale of the remainder or otherwise) even than that at which it may now be obtained. This opportunity can never occur, because the number of copies printed being limited to those required, and the entire work being the absolute property of the committee, the pledge given that not at any time shall any portion be issued at less than the subscription price will be strictly maintained.

It would be very discreditable to the profession that so valuable and important a work should be allowed to remain incomplete, when a small exertion would place the committee in possession of funds to ensure its completion.

Should it be found that sufficient response is not given to the present appeal, and that within the United Kingdom there are not 150 architects or others, with sufficient interest in the literature of the profession to contribute (even by the *easy instalments* suggested) the small sum of £15 15s. for such a book, its further progress must be stayed, or the cost to the present subscribers must be much increased, should they determine to complete it.

In the circulars recently issued, the fullest information has been given; but I shall be happy to reply to any inquiries, and to receive the names of intending subscribers.—I am, your obedient servant,

ARTHUR CATES, Hon. Sec.,
Architectural Publication Society.



HIGH ALTAR, LATTEEN TIPPERARY.



Edw. & Powell's Sculptors,

THE LIBRARY
OF THE
UNIVERSITY OF ILLINOIS

L A W.

COUNTY ANTRIM ASSIZES.—JULY 24th.
(Before the Right Hon. Justice Morris and a special jury.)

THE BELFAST ALBERT MEMORIAL.

William and Thomas Fitzpatrick v. John Moore and James Girdwood.—This was an action by the Messrs. Fitzpatrick, builders and contractors, of Great Victoria-street, Belfast, against the executors of the late W. J. Barre, architect, to recover the sum of £500, being the sum stipulated to be paid to them (over and above the contract price) by the said W. J. Barre on condition of their completing the Albert Memorial according to his design. The memorial was completed, and the above sum was not paid. Defendants pleaded—first, that they did not enter into the contract; secondly, that the contract was rescinded; thirdly, that plaintiffs exonerated and discharged the late Mr. Barre from the contract; fourthly, that there was a special condition in the agreement that if the works were not completed within the lifetime of Mr. Barre, neither he nor his successors should be liable; and fifthly, that there was a special condition that, under any circumstances, the executors should not be liable.

Messrs. May, Q.C., Andrews, and Porter, instructed by Messrs. L'Estrange and Brett, appeared for plaintiffs. Messrs. Law, Q.C., Falkner, Q.C., and Kisbey, instructed by Mr. Samuel Black, for defendants.

Mr. May, Q.C., stated the case on behalf of the plaintiffs. The whole case, he said, was one of great singularity. His clients are the Messrs. William and Thomas Fitzpatrick, builders, and defendants are executors of the late Mr. W. J. Barre, architect. It appeared that in 1865 it was proposed in Belfast to erect a monument to the memory of the late Prince Albert. For the purpose of carrying that project into execution, a committee and sub-committee were appointed; and, in the month of June in that year, the gentlemen who had the charge of carrying out the undertaking issued advertisements calling on parties to send in designs. Upwards of seventy were accordingly sent in. The sub-committee, whose duty it was to make a selection of such as they would recommend to the adoption of the committee, chose out one, in their opinion, most deserving of credit—the design which bore the motto, "*Veritas*"—and allocated the second place to the one which bore the motto, "*Pulmam qui meruit ferat*." On the selection being submitted to the general committee, they reversed the order, and selected the one to which the sub-committee had assigned the second place. It afterwards appeared that the design bearing the motto "*Veritas*" was that of Mr. W. J. Barre, while the other one was that of Messrs. Lanyon, Lynn, and Lanyon. Under these circumstances, a considerable discussion arose in town as to the merits of the two designs, a great many thinking that Mr. Barre's should have been selected. Mr. Barre, with the object of inducing the public to reject Messrs. Lanyon's design and accept his, about the month of June, 1865, published a letter in one of the papers in town, in which he stated he would guarantee to have the column with the statue substantially and properly constructed according to his design for £1,800. That only referred to the superstructure, leaving out of view the foundations, which cost £750 additional. Mr. Barre made this proposal with the object of enlisting public sympathy, and getting his design accepted. This proposal was made on the 23rd of June, 1865. On the 24th of the following month a general meeting of the subscribers was held, when Mr. Barre, in reply to Mr. Lytle, the then Mayor, publicly stated that he was prepared to carry out the proposal he had made in his letter, and accordingly a resolution was passed accepting his design. Mr. Barre then applied to the Messrs. Fitzpatrick, who made a calculation, and told him the work could not be done for less than about £4,000. Under these circumstances, he found himself in a considerable difficulty. He explained the whole

matter to the Messrs. Fitzpatrick: that he was bound to get a contractor to carry out the work for £1,800; and proposed, if they would send in a tender for the building for that amount—£1,800 for the superstructure and £750 for the foundations—to pay them an additional sum of £500 on the completion of the work. He did more than that, for he also promised, in case they would assist him in his present difficulty, that he would use his influence as an architect in getting them contracts. The Messrs. Fitzpatrick, after some consideration, agreed to the proposal, and accordingly a written agreement to that effect was drawn up and signed by both parties. The Messrs. Fitzpatrick then sent in their tender to the committee, offering to build the superstructure for £1,800, and the foundations for £750, and their tender was duly accepted. According to their contract they were bound to complete the foundations by the 1st of March, 1866, and in case they were served with a notice on or before that date to proceed with the superstructure, they were bound to have all completed within a year. Some rumour having been whispered in town as to some such arrangement between Mr. Barre and the Messrs. Fitzpatrick, and Mr. Barre being anxious that the fact of such an arrangement being in existence should not be disclosed, he proposed that the agreement as to the £500 should be enclosed in a sealed envelope, and consigned for safety to the custody of Messrs. L'Estrange and Brett, who were the solicitors for Messrs. Fitzpatrick. The latter, fully trusting him, agreed to this, and the agreement was accordingly sealed up and entrusted to the gentlemen referred to. On the back there was an endorsement to the effect that it was not to be opened until the completion of the Albert Memorial, and was not to be given up, except on the joint instructions of the Messrs. Fitzpatrick and Mr. Barre. Some delay took place in the commencement of the work, owing to a dispute about the diversion of a sewer that ran under the place where the memorial was to be erected; and whispers about the agreement between Mr. Barre and Messrs. Fitzpatrick having gone abroad, several parties asked Messrs. Fitzpatrick was there any truth in it, and they, not liking to give a definite answer, referred the parties to Mr. Barre's lawyer, who again referred them to somebody else. Mr. Barre, fearing that the Messrs. Fitzpatrick, if questioned before the committee, would have to explain the whole matter, proposed to them that the document in the hands of Messrs. L'Estrange and Brett should be delivered up to him, so that in case the question was asked them point blank, they might be able to give a direct answer, and say there was no such agreement. The Messrs. Fitzpatrick, fully confiding in Mr. Barre's honour, accordingly gave him a letter to Messrs. L'Estrange and Brett, asking them to give up the packet entrusted to them. Mr. Barre went without delay, and obtained possession of the agreement, which he at once put into the fire. The Messrs. Fitzpatrick were then at full liberty, if questioned, to say that there was no such agreement in existence. They had only Mr. Barre's promise; but, acting on that promise, they proceeded with the work, and carried it on to completion. Mr. Barre died in the autumn of 1867, and by his will, which bears date 1865, he disposed of his assets in favour of the defendant's children. After his death, the Messrs. Fitzpatrick went to Mr. Black, Mr. Barre's solicitor, and asked him how they stood with respect to the secret contract that he was aware Mr. Barre made with them. Mr. Black replied, "I am afraid you have lost your money;" and on asking him how that could be, he produced a document purporting to be a copy of the original agreement entered into between Mr. Barre and them, and which contained the following clauses:—"Provided their said tender shall be accepted, and the buildings and works shall, during the lifetime of the said William Joseph Barre be completed;" and "if the sum of £500 shall not be paid during Mr. Barre's lifetime, all liability, therefore, shall cease, and neither

the same, nor any part of it, shall be payable by, or recoverable from, any of his executors or assignees." As the agreement was first delivered to the Messrs. Fitzpatrick, neither of these clauses existed in it, and, really, he thought they were the most extraordinary provisions ever he had come across in all the course of his experience. He understood the defendants were about to rely on these clauses, but he would prove they never had any existence in the original agreement. The amount expended by the Messrs. Fitzpatrick in erecting this building was about £4,000, and they had only got £1,800 and £750, and it would, he thought, be very hard that, having undertaken the contract for the benefit of Mr. Barre, they should be obliged to bear all the loss, and not get some compensation.

William Fitzpatrick examined by Mr. Andrews.—Am one of the plaintiffs in this case. Recollect designs being advertised for the Albert Memorial. Remember a letter of Mr. Barre's in the newspapers on 23rd June, 1865, offering to complete the work for £1,800. He called on me afterwards, and asked me to accompany him to the Town Hall. The designs were not there, and we then went to the Commercial News-room, where he showed me a design, which he stated was his. Priced the quantities up to £4,350, including the figure. That was for foundations and all. In the following August I and my brother met him again, by appointment. That was on Monday, 14th August. We met in Fisherwick-place. He said he was glad we had all met, and asked us down to his office. On going there he told us he had got himself into a terrible fix, and said surely we were not serious in our estimate. I said he could never build it for the money he stated, and he should have known that. He asked me what I would take to send in a tender and do the work for £1,800. I wanted £1,000 over and above the £2,500 he proposed for all. He said he would give £500 in cash, and would make his patronage worth £500 more. After some consideration we agreed to that. Mr. Black was accordingly sent for, and he (Mr. Barre) gave him instructions to prepare an agreement that would bind him to give us £500 in case our tender was accepted. We then sent in a tender at £1,800 for the superstructure, and £750 for the foundations, and that tender was accepted. Some delay occurred before the building contract was signed, owing to our objecting to a clause binding us to divert the sewer and re-make the street. That clause was ultimately left out, and the contract was signed. I think it was in Mr. Barre's office. After we signed it, I asked Mr. Barre about our agreement, and he said he was prepared to sign it any minute, when the agreement was read over to us. We met one day afterwards at Mr. Black's office. This document [produced] is a true copy of what was read to us. Some one, either Mr. Black or Mr. Barre, suggested the propriety of not signing this document till after Mr. Lytle, the Mayor, would perfect the contract about the memorial. We all approved of that. I brought away the copy with me with a view of showing it to my brother. They approved of my showing it to him. I communicated with my brother by letter on the 22nd Nov. in reference to this matter. That was the day I signed the building contract. My brother was at Roxborough, Lord Charlemont's place, near Moy. I went there the next pay-day, bringing this copy of the agreement with me. I got this copy from Mr. Black himself. I afterwards learned from Mr. Barre that Mr. Lytle had signed the building contract. I then said to him, "What about you signing?" He said he was ready to sign any time. I said, "No time like the present," and we went to Mr. Black's office. Mr. Black produced the document, and said, "Do you want it read again?" I said, "No." Mr. Barre and I accordingly signed it. We then had a discussion as to where it should be deposited. I suggested it should be left in the Northern Bank; but Mr. Barre objected, saying that the Northern Bank were subscribers, and he would not like them to know anything

about it. He wanted it left in Mr. Black's safe; but it was ultimately agreed it should be deposited with Messrs. L'Estrange and Brett. I had a visit shortly after from some members of the committee. It was about the middle of March, 1866. The Lord Bishop of Down, Mr. Lyons, and Mr. Finlay were the parties who called on me. I told Mr. Barre about their visit. I stated to him that these gentlemen had asked me if I had any bills or bonds in reference to this work other than the regular building contract. I also told him that I had informed them that, even if I had, it could not affect them, and referred them to Mr. Black, the committee's solicitor. Mr. Barre then said it would be a desperate thing if the matter was found out, and asked me to give up the agreement. I said I would think of it. I afterwards saw him, and he asked me what I would say if asked point blank by the committee. I said, "What will I say? He replied 'What will you say?' I said, 'What can I say? they might put me on my oath.' We then parted. I saw him some days after, and thinking a pity of him, I agreed to give him a letter to Messrs. L'Estrange and Brett to deliver up the document. I gave him a letter, and I believe the document was given up to him. After the document was given up to him, he came to me and said, I was free; I might write a letter to Mr. Lytle stating I had neither bills nor bonds. I did so. That was on the 29th March. On the following day I wrote a letter to Mr. Barre, stating that I had so written to Mr. Lytle, and was adding that, now we had given him the agreement, and had only his word of honour as a gentleman, we wished he would put his promise in writing in reference to paying us £500 on the completion of the Albert Memorial, and also, that he would do what he promised in respect to the new Provincial Bank, and also that he would treat us fairly in respect to the Roxborough extras. I afterwards heard of Mr. Barre's death, and calling on Mr. Black, his solicitor, I asked him how we stood about the money. He said he was afraid we had lost it. I said, "How is that?" He replied, "Have you not the agreement?" I said, "Don't you know well enough it was burned?" He then said, "Sure you have the copy of the agreement; you have not burned that?" I said nothing, and he produced the document [produced], which purported to be a copy of the original agreement. This document contains clauses exempting the executors from liability in case of Mr. Barre's death. These clauses were not in the original agreement. Mr. Black appeared angry when I told him the document he produced was not a copy of the original, and said, "Why do you accuse me of putting these clauses in?" I afterwards brought down the copy he originally gave me. I did not let him read it.

Cross-examined by Mr. Falkiner, Q.C.—I believe if Mr. Barre were alive himself, he would admit this claim. (Handing witness a letter)—Is that Mr. Barre's handwriting?—It is. Do you believe, in view of that letter, he would admit this claim?—I don't see much in this referring to it at all. I see a paragraph in this letter that I have no hesitation in swearing is not true. Do you know Mr. Durham Dunlop, to whom this letter is written?—I do not. After the letter of the 30th of March, 1866, till his death in 1867, have you a scrap of writing from Mr. Barre in reference to this transaction? I have not. Who were present when this agreement was signed?—Mr. Barre, Mr. Black, and myself. Were you ever asked to give this document up?—I was asked. Did you give it?—I did not. Who asked you?—Mr. Black. Did you tell him you hadn't it?—I did. You told a lie?—I did. Do you think a lie or an oath is the best way to win a case?—I kept it lest Mr. Barre should have too much power over us. Did Mr. Barre say, "What would it be to me if the Memorial is not finished in my lifetime?"—He did not. When you falsely told Mr. Black you had not this copy, was he satisfied?—He asked me for it once or twice. Did you tell Mr. Black he had forged this new agreement?—I said he had changed it. That's as true as everything else? It is just as true as when you told him you had not the copy?—I was excited, and might have used the word "forged." What interest had Mr. Black in it to forge it?—They were all brother Masons.

Mr. Falkiner—I'll not ask you another question. You may go down.

Thomas Fitzpatrick examined by Mr. Porter—I was present at an interview between Mr. Barre and my brother about the Memorial. Mr. Barre said he was in a great dilemma about the matter, having engaged to get it done for £1,800, and we agreed to put in a tender for the work for that amount in case he signed a document to give us £500. I was afterwards at Moy, and received a letter on the 22nd of November about the matter. My brother afterwards came down, bringing with him a copy of the agreement which we and Mr. Barre were to sign. This document [produced] is the one my brother brought to me. It contained no provisions exempting the executors from liability in case of Mr. Barre's death.

I afterwards signed the contract with Mr. Lytle about the building. I never saw nor entered into any other agreement with Mr. Barre, other than the one the copy of which was submitted to me by my brother.

Cross-examined by Mr. Kisbey—You had signed the building contract before you saw the copy of the agreement with Mr. Barre?—Yes. Do you remember seeing Mr. Barre about the close of March or beginning of April?—Yes. Had he a letter?—Yes. That was the letter that was read here?—Yes. Did he tear it and throw it at your feet?—He was always tearing pieces of paper. Did he on that day tear up a letter he had received from your brother?—He read a letter to me. Was that the letter in which your brother stated he was to do all he could for him about the Provincial Bank?—Yes. Will you swear he did not on that day tear up the letter and throw it at your feet?—He was in a great rage on getting the letter, and, crumpling it up, threw it on the ground. I had never seen Mr. Barre's plans.

To Mr. Porter—I never signed any agreement containing a clause exempting Mr. Barre's executors from liability.

To his Lordship—The date of the interview I had with Mr. Barre was either the 14th or 15th August.

To a Juror—Mr. Barre had not repudiated his liability to pay the £500 on the day he crumpled up the letter.

James Andrews examined by Mr. May, Q.C.—I and my partner were subscribers to the Albert Memorial Fund. I remember being at a meeting of the general subscribers. Mr. Lytle, the Mayor, was in the chair. Mr. Barre was there, having been sent for at the suggestion of one of the subscribers. Mr. Barre was asked if his design could be carried out for £1,800, and he said it could. It was upon that answer the whole matter hung. His design was then accepted. Lanyon, Lynn, and Lanyon were not asked in my presence what the completion of their design would cost.

Thomas L'Estrange examined by Mr. Andrews—I am one of the partners in the firm of L'Estrange and Brett, plaintiffs' solicitors. On the 22nd December, 1865, we received a sealed packet from Mr. Barre and the Messrs. Fitzpatrick, and we put it in a safe. It remained there till the spring of 1866. I gave it up to Mr. Barre, on producing an order signed by himself and the Messrs. Fitzpatrick to hand it over to him. On receiving the packet, he tore it up, and put it into the fire before my eyes. The packet was sealed, and I gave it up to him as I received it. We were the solicitors for the Messrs. Fitzpatrick at the time; but we did not charge anything for this.

John Lytle, J.P., examined by Mr. May, Q.C.—Was Mayor in 1865; and I recollect all these designs being sent in. Remember the design of Mr. Barre and that of Messrs. Lanyon, Lynn, and Lanyon. Mr. Barre's design was recommended by the sub-committee as being first in order of merit, and that of the Messrs. Lanyon was put second. The general committee reversed that decision. Recollect a meeting of the general subscribers in the Town Hall some time in July. That meeting was held for the purpose of deciding on which design should be accepted. Mr. Barre was sent for, and I asked him what his design could be completed for, and he said he would undertake to have the superstructure erected for £1,800. That was the sum at the disposal of the committee. Remember signing the building contract with the Messrs. Fitzpatrick. Some delay took place on account of a sewer which ran under the place where the memorial was to be erected. Subscribed myself to the memorial. All the subscriptions are not yet paid up.

His Lordship—That's the way generally with public subscriptions.

Cross-examined by Mr. Kisbey—In October, 1867, after Mr. Barre's death, another architect was appointed. A letter was sent to the Messrs. Fitzpatrick, intimating this to them, and directing them to proceed with the work. Cannot say whether any part of the superstructure was commenced during Mr. Barre's lifetime.

Wm. D. Caughey, jun., examined by Mr. Andrews—Am secretary of the Albert Memorial Committee. Cannot tell by reference when Mr. Lytle signed the building contract. On the 4th October, 1865, he was at liberty to sign for the foundations.

Charles Sherry examined by Mr. Porter—Was assistant to the late Mr. Barre. Mr. Barre informed me of his design having been accepted. Was aware of the sum £1,800. Was afterwards present at an interview between Mr. Barre and the Fitzpatricks. That was the first intimation, he said, that the amount would probably exceed the sum. He said he had bound himself to the committee to have the work done for £1,800, and that he would have to pay the difference to the contractors if they would not take it at the £1,800. It was afterwards agreed that Mr. Barre should give them a bond for £500 over and above amount of contract. Recollect Mr. Barre telling me he had got the agreement he made with Messrs. Fitz-

patrik, and had destroyed it. He always said he would pay the £500. I never heard him at any time say his executors were not liable.

Cross-examined by Mr. Falkiner, Q.C.—Mr. Barre expressed considerable annoyance that he could not get the work done for £1,800. When the Messrs. Fitzpatrick held the interview with Mr. Barre, they said, if all things went on satisfactorily between themselves and him they would probably never call for the £500.

This closed plaintiffs' case.

Mr. Falkiner Q.C., then stated the case on behalf of defendants. He commented on the manner in which the summons and plaint was drawn up. That declaration rather deftly, after stating that it was agreed to by W. J. Barre for himself, introduced the words "for his executors, administrators, and assigns." He perfectly admitted that if one entered into a contract unqualified, the executors were bound, but it was not necessary that the executors or administrators should be expressly mentioned. On the contrary, if it was required that the executors or administrators should not be bound, it would be necessary that they should be specially exempted. However, the summons and plaint set forth that "the contract was entered into by Wm. Joseph Barre for himself, his executors, and administrators." Mr. Black, defendants' solicitor, after receiving the summons and plaint, served a notice on them asking what contract they relied on, and on the 1st July he received the following answer:—

"QUEEN'S BENCH.

"W. Fitzpatrick and another, plaintiff; J. Moore and J. Girdwood, defendants.

"SIR,—Take notice that the agreement alleged in the plaint was drawn up and prepared by yourself, as attorney for Mr. Barre, since deceased; that you are perfectly acquainted with its purport and contents; and that it was burnt by Mr. Barre himself in the presence of Mr. L'Estrange, on the 19th March, 1866. The agreement is correctly stated in the plaint, and you will take any step which you may be advised to take by applying to the Court at your client's peril.

"Dated this 1st day of July, 1869.

"L'ESTRANGE & BRETT, plaintiffs' attorneys,
8, Inn's Quay.

"To Samuel Black, Esq., defendants' attorney, 9, Suffolk-street."

That notice was important, as identifying the agreement, which was the basis of the present action, with the one that was burned—which was the one confided to Mr. L'Estrange, and deposited by him for safety in his own iron safe. Now, the question the jury would have to try was—What was the agreement? What was the agreement of the 22nd December? That there was a promise made by Mr. Barre to give the Messrs. Fitzpatrick £500, there could not be a shadow of doubt. The question was, whether there had been fraud on the part of William Fitzpatrick—for he would dismiss any charge of intentional dishonesty from Thomas Fitzpatrick—or whether there was fraud on the part of Mr. Barre in the course of conduct that had been pursued. Indeed, the case resolved itself into this, whether there was fraud on the part of Mr. Fitzpatrick, or fraud on the part of Mr. Black, Mr. Barre's solicitor. The question was—What had been done on that 22nd December, 1865, when this document was prepared, when the agreement was written out and signed, and when it was placed in safe custody by both parties? They would, no doubt, naturally be greatly astonished at the evidence given by William Fitzpatrick as to this document. Now, there was no pretence that the document which is now put forward was ever signed. No doubt the copy from which it was made was signed, but then that was destroyed with the consent of both parties, and should count for nothing. On the 22nd November this agreement with Mr. Lytle was entered into, but, up to that, there was no signed agreement between Mr. Fitzpatrick and Mr. Barre, and some delay having taken place, the Messrs. Fitzpatrick asked that this matter, should be brought to a close. He would now bring them to the meeting in Mr. Black's office on the 22nd December, 1865. That the agreement which was lodged with Messrs. L'Estrange and Brett, and which was signed at that meeting, was similar to that which had been produced by the defendants, he would demonstrate as clear as day. Fortunately, Mr. Black had taken the precaution of preserving a copy of it. [Counsel read Memorandum of agreement.] This document spoke for itself. Mr. Fitzpatrick's story was that it never was read over to him; but Mr. Black would swear to them that that statement was a gross falsehood. In weighing this matter they should not forget that Mr. Fitzpatrick was an interested party, while Mr. Black was, on the other hand, perfectly disinterested. Mr. Black would state that on that occasion when Mr. Barre and Mr. Fitzpatrick met, the circumstances of there having been some negotiation in reference to this matter having been adverted to, and the circumstance of the Messrs.

Fitzpatrick having stated that probably they would never ask for the money at all, having been mentioned, Mr. Barre alluded to his having originally been of opinion that the additional £500 would be wholly unnecessary, and Mr. Fitzpatrick again said that very probably they would never ask for it at all. Mr. Barre said there would be a great many ways in which he could be of advantage to them. His failing health having been alluded to, he turned round and said, "But if I were to die before this is completed, what advantage will it be to me?" He then asked Mr. Fitzpatrick was he willing to assent to a proviso being put in that the money must be paid before his death, and that in no case were his executors to be liable, and Mr. Fitzpatrick assented. The document was accordingly prepared, a clause containing this proviso having been included in it, and signed by Mr. Barre. In the following March that document was destroyed. His case, however, was that the document which he had read was a binding agreement between the parties. He never pretended to repudiate the agreement entered into on the 22nd December; but what he contended was that the essential part of it was the last—the part stating that the contract intended that at Mr. Barre's death all liability should cease. It was true enough Mr. Barre might, up to the end of his life, have said he would pay the £500; but did he ever say his executors would pay it? What he did say was, "I will have to pay the £500," and he was always perfectly ready to do so. A letter written to Mr. Barre by the Messrs. Fitzpatrick, and bearing date the 30th March, 1866, was put forward by the learned counsel on the opposite side with considerable skill, as if it was an admission of the contract by Mr. Barre. Mr. William Fitzpatrick knew well enough that this letter had been torn into pieces. Could anyone doubt that that letter was repudiated, with indignation by Mr. Barre. He (Mr. Falkner) did not mean to say he repudiated it on account of its reference to the £500. No; Mr. Barre admitted that; but his indignation arose from the insinuation contained in it that he had entered into a fraudulent arrangement with the Messrs. Fitzpatrick, so that he would deal unfairly with the employer, between whom and the builder he, as architect, professionally stood. The letter ran as follows:—

"Sir,—Agreeably to your instructions, we have posted yesterday the enclosed letter to the Chairman of the Albert Memorial Committee; and now that we have given you up the agreement, and have nothing but your word of honour as a gentleman, we wish to put in writing your promises in case we build the Memorial, which it is our intention to do. 1st. That you pay us the amount mentioned in the agreement, in case we request you to do so, on the completion of the work. 2nd. That you do all you promised with regard to the new Provincial Bank. 3rd. That you will treat us honestly and fairly in respect to the extra work already done, or to be erected at Roxborough, by giving us the written orders as the works proceed, and all extra work already done to be for to-morrow, as promised. FITZPATRICK, BROS."

It was evident that that letter contained the insinuation that Mr. Barre was to act the part of the unjust steward, and say to them, "Take your pen, and sit down quickly and write fourscore." No wonder Mr. Barre crumpled it up and flung it at his feet. With reference to the last clause of the letter, about his certifying for the extra works at Roxborough, Mr. Barre gave them the next day the following certificate, and that was the only document he ever gave them up till his death:—"The above memorandum of work executed as deviations from the plans and specifications is accurate—the quantities to be afterwards ascertained." He (Mr. Falkner) stood there for a man that never in his lifetime was known to deny a liability. He fully believed and admitted his liability to pay the £500, but he denied the liability of the executors. He would now produce evidence to substantiate what he had stated, and he was quite confident the jury, after hearing it, would return a verdict favourable to his clients.

Samuel Black examined by Mr. Kisbey—Is a solicitor, and was acquainted with the late Mr. Barre. In August, 1865, received instructions to prepare a document binding Mr. Barre to pay the Fitzpatricks £500 on the completion of the Memorial. Mr. William Fitzpatrick entered into some explanations as to the matter, and said the probability was they would never ask for the money, but they wished the agreement. Believed the agreement to be an absolute one. Prepared an agreement, and gave a copy to Mr. Barre and one to Mr. Fitzpatrick. Mr. Barre repudiated the document, and said it was not in accordance with his views. Subsequently told Mr. W. Fitzpatrick that Mr. Barre refused to carry out the agreement as prepared by me, and insisted that there were other stipulations which should be inserted in it. Afterwards became solicitor to the Albert Memorial Committee, and prepared articles of agreement between the Mayor and the Fitzpatricks. William Fitzpatrick objected to a clause in reference to the diversion of a sewer. The objection was admitted by

the committee, and a new agreement was prepared, and was returned to me signed on the 15th December. It was then executed by all the parties what I notified to Mr. Fitzpatrick. Had before that asked Mr. Fitzpatrick to give me back the draft agreement. Wanted it for the purpose of adapting it to the altered circumstances of the case. On the morning of the 22nd December, 1865, Mr. Fitzpatrick and the late Mr. Barre called at my office, and said they wished to have their agreement completed. Was very particular to know the exact terms, for I felt annoyed in consequence of the previous agreement having been repudiated. Mr. Barre explained that he was only to be liable if the Memorial was built during his lifetime. I said that was strange. The words Mr. Barre used were,—"What the d— I use would it be to me to have a Memorial to the Prince Consort if I was dead and gone?" Altered the draft which I then had into the form in which it existed when it was signed, and read it out as so altered, and asked them if they fully and clearly understood it—that is, Mr. Fitzpatrick and Mr. Barre. Both expressed themselves perfectly satisfied with it. Mr. Fitzpatrick added that the probabilities were that neither he nor his partner would ever ask for the payment of the money. He also said that Mr. Barre could be of great service to them. They returned about two o'clock for the purpose of signing the agreement. I read over the engrossment to them. On the first occasion both parties agreed as to the desirability of secrecy, and asked that all documents connected with it should be burned or destroyed, with the exception of the engrossment, which was signed, and which was to be placed in the hands of Messrs. L'Estrange and Brett. The engrossment was in my own handwriting. I took the precaution of getting my clerk to make out a copy of it. That's the document [produced] which he wrote out. It is an exact copy of the agreement which was signed by Mr. Barre. It contains a clause providing that the money must be paid in Mr. Barre's lifetime, and exempting his executors from liability. When they came back at two o'clock I handed the document to Mr. Barre, and he read it. Mr. Fitzpatrick was standing beside him, and appeared to me to be reading it. It was then signed by Mr. Barre, and witnessed by myself. I then put all the previous documents connected with the agreement into the office fire. That engrossment was enclosed in a sealed envelope, on which was written the following endorsement:—"This document to be held sealed, as now, by Messrs. L'Estrange and Brett, in trust for Mr. W. J. Barre and Messrs. Thomas and William Fitzpatrick—to be retained by them until the said William and Thomas Fitzpatrick shall have completed the Albert Memorial to the satisfaction of the said W. J. Barre; and upon them handing over the said Memorial to the committee appointed for having it erected, then the document to be handed to the said Thomas and William Fitzpatrick, or upon the joint requisition of the said Wm. J. Barre and Thomas and William Fitzpatrick, it is to be handed to either party.—SAMUEL BLACK. 22nd Dec., 1865." Mr. Fitzpatrick perfectly knew everything that was in it. It was sent to Messrs. L'Estrange and Brett, and I never saw it afterwards. I kept the draft copy in a private drawer. After Mr. Barre's death, Mr. Fitzpatrick called on me, and he said he wanted to know if I had got the agreement between him and Mr. Barre. I said I had not, for I understood it was burned with his consent. He said it was a matter of some importance to him, and I said if so I could show him a copy of it, remarking that he could not have the slightest interest in it, as he knew the money was only to be paid to him by Mr. Barre during his lifetime. He seemed surprised I should have a copy. The clerk was out, and had the keys, and so was unable to get at the agreement, but asked him to call in a day or two and I would show it to him. He called in a day or two after and asked to see it. I being somewhat suspicious of him refused to give it into his hand, but read it over to him. He said—"Oh, that's a forgery; you and Mr. Barre have forged that to do us out of the money." I told him he was very impertinent, and ordered him out of the office. Before he went out he pulled out a document, which I think is the one which was produced here to-day, and shaking it at me exclaimed, "There's the agreement; we will make the executors pay the money." I said, "You are perfectly aware that's the copy of the first draft, which never was completed." He returned to my office in a few days afterwards in company with Mr. Girdwood. On coming in, the latter gentleman said to Mr. Fitzpatrick, "Now, in the presence of Mr. Black, will you repeat your statements about the agreement?" and, turning to me, he said, "We want to know the particulars of this draft agreement about the Memorial." I produced the copy of the agreement, and read the contents. Mr. Fitzpatrick again repeated his charge of forgery, and I ordered him out of the office. I have held no communication with him since. I have not the most remote pecuniary interest in this case. W. Fitzpatrick's statements about what occurred when the document was signed by Mr. Barre are not true.

Mr. Fitzpatrick perfectly understood that he would have no claim on Mr. Barre's executors.

Cross-examined by Mr. May, Q.C.—I prepared the original draft in accordance with the instructions as I understood them. I immediately delivered him a copy of it. I was not present when the contract was signed. On the 22nd November there was no interview between me and the Fitzpatricks. Before he (W. Fitzpatrick) executed the contract I told him the original agreement with Mr. Barre would not be carried out. I did not think it necessary to tell Thomas Fitzpatrick Mr. Barre had made his will before any of these transactions. It was made out by me in May, 1865. I was acting as a friend for Mr. Barre. The children of the defendants are residuary legatees under that will. It was arranged that every document connected with the matter should be destroyed. Now, how did it happen you kept a copy?—I never let a document leave the office without keeping a copy. I was acting, in a great degree, as the friend of Mr. Barre. Was not the effect of the arrangement you say entered into thus that if Mr. Barre could evade payment during his own lifetime, the executors would not be liable?—Yes.

His Lordship—Suppose the Memorial had been completed during his lifetime, and that he had delayed payment of the £500, and that a litigation had taken place about it, and that Mr. Barre had died in the meantime, would the executors have been liable?—They would not; that was the intention.

Mr. May—Did you think it was right to impose such a stipulation on those gentlemen when their solicitor was absent?—He was perfectly aware of what he was doing.

His Lordship—You stated that when Mr. Barre told you, on the 22nd December, that the money was not to be paid unless the Monument was completed in his own lifetime, you were surprised.—Yes, I was. Then, you had never heard it before?—Such is my present opinion. If you were then surprised, you could not have heard it?—There had been nothing heard about executors previously. Were you or were you not surprised on the 22nd December at such a proviso?—I was. Then, if you were surprised, could you have ever heard it before?—I did not. How, then, did you convey before that to Mr. Fitzpatrick that the agreement was to be altered in that respect?—Not in that respect. Then when you stated to me that Mr. Fitzpatrick knew, before he executed the contract of the 22nd November, 1865, that the agreement was to be varied, he only knew it was to be varied in these respects?—Well, in the first instance—Answer the question directly!—I told him it was to be varied. In what respect?—I cannot tell. Did you know anything of this variation until the meeting on the 22nd December?—I did not. Then you could not have told the Fitzpatricks about it?—I simply told him the agreement was to be varied. Notwithstanding the variations, was not the agreement about the £500 to be substantially preserved? Was there anything said about the non-liability of the executors?—There was nothing said about administrators until the 22nd December, and then it was distinctly understood.

James Girdwood examined by Mr. Law, Q.C.—About the month of March, 1866, heard something about an agreement between the Messrs. Fitzpatrick and the Albert Memorial Committee. Saw Mr. Fitzpatrick about this time. Asked him if this contract was a *bona fide* one. He said it was, and he wished he had a dozen memorials of the same kind to build; he said, when one looked into the matter, it was but a small thing after all, and his brother and himself could do it cheaper than any other firm in Belfast. Knew nothing of the matter, except what I heard from Mr. Fitzpatrick, until after Mr. Barre's death. Mr. Fitzpatrick called on me shortly after Mr. Barre's death, and asked me who was to pay him the £500. Told him I knew nothing about it, and referred him to Mr. Black. Had an interview with him before that in High-street, when the Monument had been raised 30 ft. or 40 ft. Said, "I am glad to see that you have at last commenced the Memorial." He said, "I am going on with it now, and I do not care who pays for it; it will be a monument to Messrs. Fitzpatrick Brothers, and I will put my name on the basement." At the interview following I said, "If there is any claim on us, I will pay it; but Mr. Black says you have none." Mr. Fitzpatrick said that Mr. Black had forged a document to do him out of his money." I said I could not hear him use such words about an absent party. He afterwards went to Mr. Black's office. He repeated the words. I said to Mr. Black, "Is this true?" Mr. Black immediately ordered him out of the office. The first time I heard the document referred to as the agreement was within the last five or six months. The superstructure had not been commenced when Mr. Barre died. In the month of April or May Prince Arthur visited Belfast. Shortly after I again met Mr. Fitzpatrick. He alluded to this matter, and said it was a d—d shame the money had not been paid; but that if the poor fellow himself was alive

they would not ask him for a penny, as the fact was, they had not laid a stone out of the office of Lanyon and Lynn since the Memorial was commenced.

Cross-examined by Mr. Andrews—I said to Mr. Fitzpatrick if his claim was a correct one, I would pay it. If Mr. Black said “pay it,” I would have paid it.

Mr. Kisbey having reviewed the evidence on the part of the defendants,

Mr. Andrews replied for the plaintiffs, after which,

His Lordship proceeded to charge the jury. In this case the plaintiffs sued the defendants, John Moore and James Girdwood—who were the executors of a gentleman named Barre—for the sum of £500; and, as he had understood from a question which he had put to the learned counsel for the plaintiffs, the plaintiffs say that Mr. Barre, in his lifetime, entered into an agreement with the Messrs. Fitzpatrick, under circumstances of which he would say a good deal, to pay them a sum of £500; and, as they had been already told, when a man undertakes, under certain circumstances, to pay money, should he die, his executors are liable for it, because the executors fill the position, as far as possible, of the deceased person—they are accountable for his liabilities on the one hand, and on the other, whatever claims or demands he may have, they can sustain them as he would himself,—so that, as stated by the learned counsel for plaintiffs in opening the case, and, indeed, freely admitted by the counsel for the defendants, if there was an agreement entered into by Mr. Barre to pay this £500, unless there was a proviso protecting the executors, the plaintiffs would be entitled to recover. In other words, if Mr. Barre agreed to pay the Messrs. Fitzpatrick the sum of £500 in consideration of their entering into this contract with the Albert Memorial Committee, his executors would be bound, unless specially exempted. Accordingly, the substantial defence raised by the defendants was, that Mr. Barre did not enter into an unconditional agreement to pay £500, but only into a conditional one—namely, that he was to pay the money himself in his lifetime; and, in case he happened to die, that his executors were, in no aspect of the case, to be liable. It was competent in law for persons to enter into an agreement which was not illegal, and there was no illegality in this, nor was there anything immoral in it. A person might enter into any agreement, no matter how strange or extraordinary, if it was not immoral or illegal; but he confessed that during the whole course of his experience a stronger agreement than this he had never come across—indeed, he thought it would be impossible to conceive a stronger one. This struck the legal mind of Mr. Black, the solicitor who drew it up, for he stated he was surprised at it. It was not that there was anything curious in the phraseology, but his common sense seemed to have been astonished at it, because he supposed from the beginning of time such an agreement as this was never entered into before, if, indeed, it was entered into on this occasion. However, as he said it was competent for parties to enter into any agreement, provided it was neither illegal nor immoral. He had heard of many persons not wishing to pay money during their own lifetimes, and putting in provisos that they should not be liable during their lives, but this was the first time he had ever come across a case where a person had stipulated that he should be personally liable, and that his executors should be exempted. This was the first time he ever heard of a man who was so fond of his executors that he insisted on paying money in his own lifetime, and exempting his executors; and upon the evidence of Mr. Sherry, he (Mr. Barre) was only too anxious to get the money paid, and he could quite understand that gentlemen, finding himself in a false position, being anxious to get rid of the whole transaction. They had been asked, in an address which had been delivered with that marked ability which always characterised the addresses of the learned gentleman to whom he referred, Mr. Kisbey, to rescue the memory of Mr. Barre from opprobrium by their verdict. Certainly poor Mr. Barre—and he might very properly apply the term to him, for he was sure the last two years of his life had been harassed by this nasty transaction—had shown himself most anxious to get it bushed up, while the executors did not seem disposed to adopt a similar course. They asserted their legal rights, and said the money which Mr. Barre was so anxious to pay in his lifetime they were bound not to pay, but in doing so they necessarily dragged forth the entire of these ugly transactions—transactions which Mr. Barre would fain have concealed. His Lordship then glanced at the facts detailed in evidence in reference to the selection of the design and Mr. Barre's having promised to get the work completed for a certain sum, and stated that, with regard to Mr. Barre's proposal to the Messrs. Fitzpatrick to give them an additional £500 in case they tendered for it at the reserved sum, he did not see there was anything dishonest or morally wrong in the transaction. Mr. Barre, in promising to use his influence for the Messrs. Fitzpatrick's benefit, did not promise to do anything wrong, but merely, as he un-

derstood it, promised to act as their friend—and it was always useful in every profession to have a friend to give one a lift—intimating that, even if they lost by this transaction, he might fairly and honestly put things in their way which would make up the loss. And it appeared that on the consideration that Mr. Barre was to stand their friend, they agreed to reduce their demand for doing this work to an amount exceeding by £500 the amount they were to receive from the committee. It was then arranged that the Messrs. Fitzpatrick were to tender for the contract at £2,550—in other words, that they were to charge the committee £2,550, and Mr. Barre £500. He did not see anything immoral or illegal in all this. It was true it was secret, and most transactions, it was curious to say, which began by parties having to keep their secret did not generally turn out very well; and it would probably have been much better for Mr. Barre to have gone boldly to the committee and have told them that he could not get a contractor to take the work at £2,550, and that, as he had promised to get it executed for that sum, he was prepared to pay a contractor £500 out of his own pocket. However, it having been arranged between the parties that Mr. Barre was to give this £500, Mr. Black, the solicitor, was sent for, and received instructions to have an agreement drawn up. He (his lordship) thought if Mr. Barre had drawn up a few lines himself, such as, “I agree with you that, if you get the contract and complete it for the sum mentioned, I will pay you £500 in addition,” it would have served as well as getting a large formal document drawn up by a solicitor. However, Mr. Black got his instructions, and certainly it appeared never to have entered into the mind of Mr. Barre that there was to be anything in the document but what would occur to ordinary mortals—namely, that, as these two men were about taking a contract at considerably less than cost price, and that, as he (Mr. Barre) had to save his position, and reputation, and character as an architect, he was to make up the difference. Accordingly, the agreement was drawn up, and a copy of it was handed to Mr. Wm. Fitzpatrick, and a second copy—a stamped copy—to Mr. Barre. This was on the 14th August. The matter, however, did not stop there, because Mr. Black stated that Mr. Barre entirely repudiated this agreement, and said it should be varied. This was about the middle of August, and at or about the 15th August there appears the only entry that is in Mr. Black's book as regards this transaction. The reason given by Mr. Black for this was—and it was a fair one—that he was not charging these parties anything. Well, he was not really doing very much for them; but, at the same time, it was certainly wonderful how it generally happened that when things were not paid for they never appeared to be done as well as if they were paid for. If this had been a paid transaction there would have been all sorts of details in Mr. Black's books, such as, “To attending to Mr. Barre” on such a day; “To going to him on such a day for instructions.” The first entry was on the 15th August, and it ran as follows:—“To J. Barre, Esq., draft agreement, engrossing same, making alterations required by law, and re-engrossing the same.” Now, what were these alterations? The next entry was on the 19th August, so that between the 15th and the 19th the clerk must have made this entry. As he understood the case from Mr. Black, the only alterations were upon this eventful day of the 22nd December. Now, again, what were these alterations referred to on the 15th August? Mr. Black's evidence was entirely inconsistent with any, and he had given no account of them. He said he was surprised at this proviso of the 22nd December, and he stated that there were to be variations about the cost. Then what about the re-engrossment?

Mr. Law—Mr. Black says these alterations referred to the character of the work.

His Lordship—Ay, but what about the re-engrossment? There was no evidence given by Mr. Black about any document except the engrossed document on the 14th and 15th August, and the document made on the 22nd December. If that entry was a true entry, there must have been three of these documents, but they had never been told about the third. That entry showed there must have been an original engrossment, and also a re-engrossment, but they had got no account of this in the evidence. It would be most useful that they should have some account of what the alterations were that Mr. Barre required, for if they had they would have a perfect agreement before the 22nd December. As to the proviso exempting the executors, Mr. Black swore that Mr. William Fitzpatrick understood it. They had heard it was not read over to him after being engrossed. It was only an inference of Mr. Black's that Mr. Fitzpatrick understood it. But it was suggested he understood part of it, and did not understand the rest, the rest being like the part of “Hamlet” in the play of *Hamlet*. His Lordship then proceeded to point out that the time the Fitzpatricks signed the building contract with the committee they could not have been aware of any such proviso exempting the executors

for even a month afterwards. Mr. Black himself was surprised at hearing of it. Besides, Thomas Fitzpatrick had expressly told them that the time he signed the building contract he did not so fully aware of the agreement about the £500, but totally ignorant that it contained any such proviso. His lordship also was of opinion that when the second agreement was signed by Mr. Barre, Thomas Fitzpatrick as well as William should have been present. Mr. Black was of this opinion himself originally; but when Mr. Barre said it was unnecessary to send for him, as he (Mr. Barre) was the only person that was binding himself, Mr. Black was satisfied; but that was on the assumption that Mr. Barre had not bound himself before. However, this document drawn up by Mr. Black contained ample evidence in itself that it should be signed by all parties; for it stated—“In witness whereof the parties aforesaid”—W. J. Barre on the one hand and the Fitzpatricks on the other—“hereunto subscribe their names.” Now, Wm. Fitzpatrick did not attach his name to it at all, and Thomas Fitzpatrick was fifty miles away. Mr. Black said he thought Thomas ought to have been present. With what object? To sign. Why? William did not sign; it was only signed by Mr. Barre. His lordship then proceeded to say that if the jury thought the proviso referring to the executors was not introduced into the document at Messrs. L'Estrange's, and acquiesced in by William Fitzpatrick, the defendants would have no case whatever. However, taking all the circumstances into account, he thought it would be rather a false conclusion to come to that it was not in the original document. It was quite a different thing, however, whether Mr. Fitzpatrick understood it was in it, or whether he understood its purport. It would be for the jury to say whether this was explained in that full way which would make Mr. Fitzpatrick understand it, and whether he thoroughly understood it. He was not at all sure that even Mr. Black thoroughly understood the effect of this proviso. If they came to the conclusion that Fitzpatrick did not understand it, and that there was a former agreement—a completed agreement understood by the parties as a completed agreement that they were to get £500 when the Memorial was completed—in his view, in point of law, there would be no defence to this action. His lordship continued at some length to comment on the evidence, and concluded by pointing out the distinct issues on which they were to find.

The jury found a verdict for the plaintiffs, £500 damages and 6d costs.

His lordship asked them, in order to have the case finally settled, to find on the following question:—“Whether you are of opinion that Wm. Fitzpatrick did or did not understand and assent to the proviso introduced by Mr. Black?”

The Jury found that he did not.

CORK COUNTY RECORD COURT.—JULY 26th.

(Before Mr. Justice Fitzgerald and a Special Jury.)

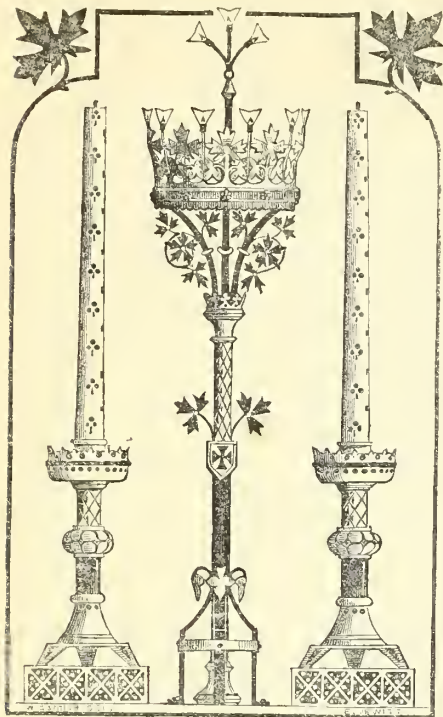
Stokes v. Hill.—Mr. Waters, Q.C., stated the case. The action was for negligence, and the damages were laid at £1,500. The plaintiffs were the Messrs. Stoker, provision merchants, and the defendant Mr. Henry Hill, architect. In 1868 plaintiffs, having taken the premises formerly occupied by Mr. M'Swiney, resolved to have them rebuilt, and engaged Mr. Hill to prepare plans and specification. The tender of Mr. D. Barrett, for £800, was accepted. One of the plaintiffs had an interview with Mr. Hill, and said to him, “Now, as the contract is arranged to be given to Barrett, is it not better for me to go to some attorney to draw up a letter of agreement?” and Mr. Hill replied that there was no necessity, and that he would do it for him. “Then,” said Mr. Stoker, “mind that you bind him to give sufficient security for the due performance of the work.” Mr. Hill prepared an agreement, which he got signed by Mr. Barrett, and which he accepted on behalf of the Messrs. Stoker. [Counsel described the premises.] One of the adjoining tenants saw that the party wall was bulged in, and consulted an architect of experience, who pronounced it to be in the very worst possible state. Messrs. Stoker's attention was called to the state of the wall. Mr. Barrett saw it, and pronounced it bad. Mr. Hill said to Barrett, “Go on with the work, and I will bear all the consequences.”

James Cremen examined by Mr. Heron, Q.C.—Is owner of the premises No. 4, in Cook-street, formerly a Baptist church; before these improvements there was nothing higher than the party wall between his premises and No. 3; remembered when Mr. Barrett was taking down No. 3 in October last; did not notice anything about the party wall until the house was down, when he saw it shake; he also saw it bulging out towards his house. Immediately before the accident, Mr. Hill, accompanied by one of his masons (Delany), examined the wall, and he directed Delany to come on the following Monday to take down the wall, piece by piece, and rebuild it. Witness's premises were greatly injured by the accident.

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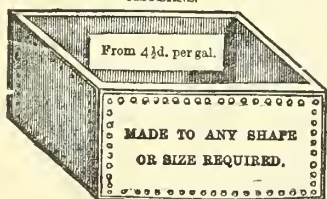


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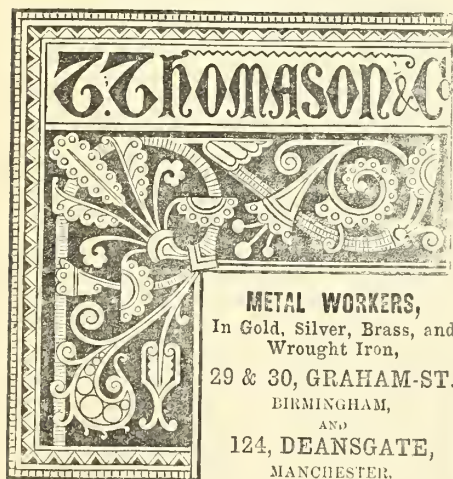
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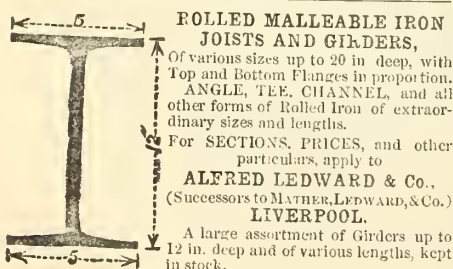
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Cattle Medicine of all kinds.
N.B.—Every article is warranted genuine, and at the lowest
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The PLOT of GROUND (ten statute acres) lying between
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Also
Patent Galvanized and Galvanized Tinned Tiles
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The Irish Builder.

VOL. XI.—No. 232.

The Wesleyan College, Belfast, and its Architect.



IMPORTANT arbitration has just been held before Sir Chas. Lanyon, in Belfast, between the Committee of the Wesleyan College and their architect, Mr. William Fogerty, F.R.I.B.A., of Dublin. The following are the particulars: As our readers will remember, in the year 1864 the committee invited a limited number of architects to submit designs for the building, and the design of Mr. Wm. Fogerty being selected, the work has been since carried out under his direction, the College having been opened publicly just a year ago. The builder was Mr. James Henry, of Belfast, whose character stands deservedly high; and the building has commanded no small share of encomium from the local press for its architectural character and the excellence of its arrangements. The builder's accounts, and those of the other tradesmen, were all wound up and adjusted smoothly and satisfactorily by the architect and his brother, and paid by the committee soon after the opening; and all seemed satisfactory until the architect sent in his own claim in November last, amounting to somewhat over £1,000, made up of the usual 5 per cent. commission on the cost of the works—over £16,000,—travelling expenses, and some incidental items, being based generally on the scale of charges of the Institute of Architects, which had been submitted to the committee in the course of the employment, and in accordance with which they had paid the architect various sums on account—amounting to £555—during the progress of the works. Notwithstanding this, when the final account was sent in, the committee raised a series of objections to it, refusing to recognize the aforesaid scale of charges as of any authority. It was avowed that their opposition was to a great extent based on the indecisive result of the well-known case known to most of our readers, which led them to believe that these charges were not recoverable in our courts of law. The chief objections taken were to the travelling expenses and commission on the extra works; also to all the incidental items, and to paying the ordinary commission on a road constructed under the architect's direction through the College grounds. When these objections were started, the architect immediately offered to refer his claim to "Sir Charles Lanyon, or any other architect of high standing." To this proposal the committee would give no answer for several months, until at length the architect placed the matter in the hands of his solicitor. The

committee then made a counter proposition to refer the matter to three arbiters, one to be named by each party, and the third by the Belfast Chamber of Commerce; but the architect declined this, "as such a mode of reference, requiring the examination of numerous professional witnesses, was likely to prove quite as costly, and far less satisfactory, than a regular trial under legal directions." The committee then agreed to the reference to Sir Charles Lanyon, "to be without professional intervention on either side." When, however, the deed of submission was being prepared, the committee brought forward for the first time a series of counter claims for damages against the architect, alleging that he had delayed furnishing the drawings, also that there were certain defects in the sewers and chimneys, and that the road was badly constructed, and would not be passed by the Town Surveyor. The amount of damages claimed on these accounts was not specifically stated, but it was at one time mentioned as £500, and, at another, as more than the architect's whole commission. To these claims being introduced into the reference (which was agreed to be only on the amount of his own claim), the architect at first objected, but subsequently waived his objection. He, however, wholly repudiated them, denying the delay and his liability relative to any alleged defects, as, by the contract, the builder was answerable for any such that might be discovered within six months of the final certificate, and the committee had allowed the whole of that time to pass without any complaint on the subject, and had paid off the builder during that time. He also alleged that they had made additions and alterations to the building unauthorized by him, to which these defects were largely to be ascribed. As regards the road, he alleged that its not being passed by the Town Surveyor was because the committee would not sanction the extra expense of paving the footways required to conform to the requirements of the Corporation, and at the investigation he produced reports from the Town Surveyor, and sundry reports and estimates of his own confirmatory of that view.

Mr. Hewitt, solicitor, of the firm of Johns, Hewitt, and Johns, having appeared on the part of the committee, was objected to by Mr. Fogerty on the ground that there was to be "no professional intervention on either side," as already stated. The arbiter accordingly offered to adjourn, that both sides might be equally represented; but it was subsequently agreed to discuss the matter without reference to legal points, Mr. Fogerty dispensing with legal assistance. After a careful investigation, occupying three days, the arbiter, having examined numerous witnesses on both sides, and made an inspection of the building, awarded that the committee were to pay the architect the sum of £386 in addition to the £555 paid on account, making £941 in all, in full settlement of accounts between the parties.

We think there can be but little doubt that this award fully relieves the character and claims of the architect from the aspersions cast upon both by the conduct of the committee. It has been harassing enough to him to have to remain out of his honest earnings for a year or more, and go through the labour and anxiety of an arbitration to recover them. As for the counter claims, the time and manner in which these were brought in were most significant of their true character, apart from the award which shows pretty well what they

were worth. If the committee had honest claims for neglect on the part of their architect, and defects in the building, why was all mention of them withheld till nearly a year after the completion of the works? It appeared also during the investigation that the architect had repeatedly applied in vain for particulars of these alleged defects, but, up to the day of arbitration they were not forthcoming.

We do not know whether the committee were really serious in expecting that he should pay them £500 on such grounds, or suffer his whole commission to be swamped by them or not. As they never offered him a shilling in discharge of his claim until compelled by the arbitration, it looks as if they were. We think it more likely, however, that these claims were just put in by way of getting something knocked off an account known to be otherwise unexceptionable.

It is indeed grievous to an architect, whose professional character is almost as dear to him as life, and who has faithfully discharged his duty, to find matters of this kind trumped up against him for the mere object of knocking off a few pounds of his claim, reckless of the injury to his feelings and character involved. However, it must be some satisfaction to Mr. Fogerty to find that when his building has been examined by such a thoroughly independent and able judge as Sir Charles Lanyon, these mighty defects and damages have vanished into thin air. The award being in general terms, does not state whether any sum was deducted on this account or not, but as there is seldom a claim which does not be somewhat reduced in taxation, we opine the amount of damages, if any, the committee have succeeded in getting on this score must be very minute indeed. It ought to be a satisfaction to the committee and subscribers (many of whom, we are aware, have no sympathy with the course taken by the building committee in this matter) to have it now certified to them, on such competent authority, that their building is soundly and honestly constructed, and that its defects (and what human work is perfect?) are of such trifling character. If they could only think it, they ought therefore be obliged to Mr. Fogerty for forcing them, though sorely against their grain, to have the matter thus ably and cheaply adjudicated upon. Had they gone into court with such a case, it would certainly not have redounded to the credit of the institution, and would in all likelihood have cost the committee some £500 more than they have now to pay.

We earnestly hope that we are done with this spirit of senseless opposition to claims which by this time ought to be fully recognized. No honest or well-meaning man or body of men can refuse to accord to an architect the usual charges which are now published for general information, under the sanction of the heads of a profession which for intelligence and probity is second to none. If architects are to be treated with suspicion and jealousy as to a few pounds in their own fees, they are unfit to be trusted in the important and responsible position they occupy as arbiters between their employers and the builders. If they were inclined to be dishonest they have plenty of opportunities of doing so more tempting than by making overcharges in their own accounts. The Institute of Architects deserves the best thanks of the public for the high standard of professional morality it maintains in matters of this kind, excluding every member who receives any fee or consideration from the tradesmen em-

ployed under him; but it has rendered a no less essential service in the publication of an equitable scale of charges, which no respectable employer can object to.

As for making claims for damages against architects on various grounds, this seems to be the latest device for evading payment of their fees, and should in most cases be simply looked on as such, and uncompromisingly resisted. Architects, as intellectual labourers, are no more infallible than barristers or doctors, and the law of the land, while it will punish gross and wilful neglect, will not mulct architects in damages for matters in which they have *bonâ fide* exercised a reasonable amount of care and diligence, but in which the inherent difficulties of the case may cause their efforts to fail, or unforeseen accidents frustrate them. Still less will it hold them accountable for the errors of builders or other tradesmen, unless they can be proved to have tolerated or connived at them. The neglect and the consequent damage must be clearly proved, the "*onus probandi*" resting on the claimant for damages. The case of Stoker against Hill, recently tried in Cork, and reported in our last, is a clear illustration of this; it resulted in a triumphant verdict in favour of the architect, and we expect it will be a good while before such an action is brought into court again.

SANITARY STATE OF DROGHEDA.

THE important subject of the sanitary condition of the Town of Drogheda was brought under the notice of the Corporation at its last meeting. The deputy officer of health reported that a large quantity of lime had been gratuitously supplied for whitewashing purposes; its judicious use will no doubt be of great service. The following is extracted from the local *Conservative's* report of what took place at the meeting:—

Mr. R. B. Daly said that the subject of sanitary requirements was one the importance of which could not be overrated. To deal with it efficiently, the question of sewerage should be taken up and the present defective system remodelled. To do that they would require a large expenditure. The present sewers were constructed 200 years ago; they were made perfectly flat, and the stuff washed into them from the channels and drains becomes deposited along the bottom, and accumulates there. When the hot weather comes, pestilential gases, most prejudicial to the public health, are constantly emitted from these sewers. Some of the bad effects of this were shown in the epidemic which had been raging for some months past, and which, he was glad to learn, is abating very much. A new and improved system of sewerage should be introduced; sewers, on the improved principle, and as culverts, so that no foul deposits can lodge in them, and all refuse be carried away to the river. He was aware that there was a difficulty connected with the levy or collection of a borough rate, but funds might be found for effecting this most important work, if the question were taken up by the grand jury. The amounts that could be raised by a borough rate and by county cess were very nearly co-ordinate. Nearly every member of the Corporation was also a grand juror, and if the question of sewerage was taken up by them, there was no doubt they would be able to have the town supplied with culvert sewers.

Mr. Flanagan—I think if the people of the town are consulted, they will tell Mr. Daly that they think they are quite enough burdened with county cess already.

Mr. Daly—I tell you that any man or woman who has lost a child owing to this epidemic, will not agree in that view.

Mr. Flanagan—I know that it is most desirable that an improved system of sewerage should be introduced. Perhaps we could do

it from our own funds without increasing taxation.

Mr. Mathews pointed out that great benefit would arise from having the present sewers well flushed. With the supply of water which might be made available, this could be done.

Mr. Daly said he had looked at the matter carefully, and no amount of flushing even from the water-works supply would cure the defect of the construction of the sewers. The water merely washed over the foul refuse deposited in the drains, and did not carry it away. In a properly constructed culvert the flushing would sweep away every deposit.

Mr. Chadwick said he believed there wasn't a town in all Ireland in which a greater amount of public good could be effected than in Drogheda, were those entrusted with the management of public affairs to pull together cordially and with unanimity. Drogheda has great and undeniable advantages. Instead, however, of taking advantage of the opportunities placed within their reach—what were they doing? Working against each other, bickering, engaging in petty disputes, and exhibiting, in fact, every bad feature that human nature is guilty of. He pointed to what had been done in Newry in having extensive and important works—such as they were considering—carried out. Why couldn't they do likewise in Drogheda? But no, they couldn't or wouldn't act harmoniously together; it seemed as if by some evil agency they were prevented from availing themselves of the opportunities which they possessed. He could not conceive how any town having such opportunities could allow them to go by. Here in the matter of public health, even while fever was fatally prevalent, week after week they were not taking those steps which were urgently called for, in order that the town might be purified and cleansed. Their sewerage was defective, and its condition was aggravated considerably by not having it flushed; that would mitigate the evil considerably. As to Mr. Daly's proposition, of having good sewerage made and to raise the expenditure by means of the county cess, he would remind them that in two years they would be clear of the assessment for the building of the bridge and for the gaol, so that the grand jury might well entertain the proposition if it were brought before them. They should join heart and hand in all these works necessary for the public benefit.

Mr. Gormley said with reference to the value of Mr. Carney's reports, that he reported to them that all the pumps were in the best of order. He had heard many and loud complaints with reference to the condition of one important pump, that at the head of Magdalene-street. The people of that locality complained much of the want of water, and taken in connection with that want of water supply, he should mention that in that locality scarlatina had been most widely and fatally prevalent. This was a deplorable state of things. It was true there might be water at the bottom of the pump, but the complicated instrument required the strength of a strong man to raise it.

Mr. Daly said that the question of the sewerage should be argued there. The grand jury only meet for a few hours, and then they hurriedly discuss matters in order to be ready to meet the judge. That council was the place to decide on the matter. As regards the flushing of the present sewers, of course that would be of some use, but as to that meeting the evil, his opinion was that, from the construction of the sewers, if they turned all the water of the reservoir into them it would not carry away all the rubbish and foul deposit of years' accumulation. Could they not borrow the money at a low rate of interest?

Mr. Knaggs said that they had heard a good deal on the subject of the sewerage that Mr. Daly told them was made 200 years ago, that it was not properly constructed. There was a sewer made in Fair-street only a couple of years ago, and it was so badly made that it is a most dangerous nuisance. It is merely a receptacle for all the nuisance that flows into it to lodge in it, and it is justly complained of as a most dangerous nuisance.

That was one of the sewers they made only a few years ago, so Mr. Daly need not have gone back 200 years at all. The sewer in Fair-street was not sunk deep enough so as that the refuse flowing into it would have an outlet into the adjoining sewers that would carry the refuse away. He was surprised to hear Mr. Daly talk of increasing their jury cess. Drogheda was already assessed far too heavily. The valuation of the borough was £18,000, and on that they were taxed to the amount of 10s. in the £1.

Dr. Daly—You are quite wrong.

Mr. Knaggs said their jury cess was 3s. 6d.

Mr. Daly—That's not 10s.

Mr. Knaggs said that if he was allowed he would show that he was pretty close on being correct—there was 2s. poor rates, and it was incontestible that Griffith's valuation, on which the taxation was based, was one-third over what it should be. Let them add one-third to 5s. 6d. and see what it amounts to. Then there was income tax also, and all these burdens come off the shopkeepers and residents within the borough. He and a few others had been long endeavouring to have some action taken for having the borough boundary extended as it ought to be, and if those who come into the town and use their roads and bridges were made pay their proper share of the expenditure the cess would be only about 1s. 6d. for all. That was the subject that they should take up actively. But none of these things are taken up by their wise legislators. If Drogheda doesn't improve on its present condition, property would not be able to pay the taxes. That boundary question should be dealt with by the grand jurors, and pressed on the attention of those who make the laws for us. As regarded the water supply, he believed the town was never better supplied.

Mr. Chadwick said that the jury cess was only 3s. 3d.; Griffith's valuation for the entire borough was £18,000; that did not appear, on the gross, excessive.

Mr. Mathews—I know there are some cases in which Griffith's valuation is beyond the letting value.

VANDALISM IN THE NORTH.

SEVERAL of the inhabitants of Coleraine protest against the painting exteriorly of their fine town hall. We heartily join them in condemning the step taken by the Town Commissioners. Surely, under professional advice, some less objectionable mode of preserving a fine building might have been adopted—we have always been opposed to the use of paint or "stone finish" on any building. The following letters, condemnatory of this act of "Vandalism" being perpetrated, appear in the last issue of the local *Chronicle*:—

"We beg to call the attention of the inhabitants of Coleraine to the fact that the Commissioners of the town are in the act of painting our beautiful Town Hall with paint from spire to foundation, reducing it to the level of a mere plastered building. Had the Town Hall been built with brick and plastered and painted in this way originally, it would have saved the town a large sum in the expense of building it, but the effect of painting it now will merely be to injure the appearance of the building, and incur an average annual expense of about £40 in keeping the paint fresh. We suggest a public meeting to protest against this. (Signed) A. J. A. Moody, Drummond Grant, J. C. L. Carson, C. H. B. Mackay, A. T. Carson, Thomas Mackey, Thos. G. Carson, J. S. Anderson."

"A few years ago some wiseacre, wishing to get rid of the hoar of centuries which clings to the stones in St. Paul's Cathedral, proposed to *whitewash the venerable pile!* Is it left to the Coleraine Town Commissioners to carry out this Vandalism with our beautiful Town Hall? For some days I have observed men cleaning the stones and oiling them. The latter I thought, would not much spoil the beautiful appearance of the stone, while it might preserve it from decay. But when I looked up yesterday, and saw them beginning to paint the tower, preparatory to painting all the building, I could scarcely believe my eyesight; and in the name of good taste, I beg, as a ratepayer, to protest against painting over the wrinkles and blotches which years are producing on the surface of our town's greatest ornament, and to call upon my fellow ratepayers to join in preventing what would certainly be a disgrace to our community."

FREESTONE.

THE GOVERNMENT AND THE TELEGRAPHS.*

THE scheme by which the Government proposes to avail itself of the telegraph service of the United Kingdom is now before the country, and, so far as any judgment can be passed upon the detailed information furnished at this early stage of the proceedings, there appears every reason to be content with the excellent management under which so laborious an undertaking has been conducted. It will, of course, be understood that the scheme has no party political bearing whatever. Introduced by the late Government, it has been adopted by their successors, who have simply had to deal with the measure as a question of expense, or, perhaps, to speak more correctly, as one of mere profit or loss. That the public expect to be gainers by the transfer is self-evident, for there is abundant reason to hope that the messages will be delivered with greater punctuality and despatch than under the present system, and, in the course of a short time, also at a considerably less expense. The machinery of the Post Office, although no doubt fully strained by its present requirements, can by extension be made to compass greater work: its elasticity is proverbial; and, if it has already accomplished much, there is no legitimate reason why it should not accomplish still more. It is eminently satisfactory to find the transfer of the telegraphs from public companies to Government control is not regarded as a political measure of a party character, but as a matter of expediency. The Duke of Montrose, we are assured, is as deeply interested in the result as is the Marquis of Hartington, and the late, as well as the present, Administration have but one feeling on the matter. This earnestness of purpose speaks well for the success of the undertaking, and gives the fullest promise of a profitable result.

The preliminary details of so comprehensive a measure must necessarily be somewhat tedious; but to thoroughly comprehend the bearings of the whole scheme they can scarcely fail to be instructive, and throw a clearer light upon the bargain made by the Government than could be gathered from extraneous sources. It will be recollected, then, that when the Act was passed last Session power was given to confirm certain agreements which had been entered into between the Postmaster-General and the several telegraph and railway companies interested in the telegraphs throughout the country. Little, therefore, remained than for those agreements to be carried into effect, and, virtually, they gave power to the Government to purchase these companies subject to certain provisions, the principal of which was that a sum equivalent to twenty years' purchase of the net profits of the companies to the 30th of June last should be paid to the proprietors of these undertakings. No doubt the sums claimed by some of these companies will be looked upon as exorbitant, but it must be borne in mind they each represent an annual profit, and the Government, therefore, pays for the goodwill of this profit for twenty years. The Marquis of Hartington places before the House of Commons the sums that will be, according to the most recent and reliable calculation, required for the purchase of the telegraphs in the United Kingdom, which is estimated at about £5,220,000 for the telegraph companies, £700,000 for the railway companies, and £300,000 for extensions and preliminary expenses; bringing the total, as near as can be at present arrived at, to £6,715,000. This, of course, necessarily includes charges that have already been undertaken, such, for example, as the cost of instruments, the surveying of post-offices in all parts of the kingdom, and the expenses of alterations and fittings. The gross revenue which it is anticipated the Post Office will derive from acquiring the telegraphs may, at a rough estimate, be assessed at £674,000; the expenditure will probably be £360,000; leaving a net profit upon each year of about £314,000. Then the interest upon the six

and three-quarters millions sterling which will have to be at once paid as purchase money, reckoned at 4 per cent., will amount to £270,000, or, calculated at 3½ per cent., to £236,350, leaving in the one case a surplus of £44,000 a year, or, in the other case, a profit of £77,000. The official report leaves little doubt that there will be found no difficulty in raising the money required at 3½ per cent., and it then goes on to point out by what manner the relative estimate of profit and expenditure has been arrived at. It would appear that the principal item of the revenue will be derived from inland messages, which is estimated at £514,000 per annum, after the following calculation. The number of inland messages for the year ending last December was 6,000,000. The ordinary increase that had been ascertained to exist in every one of the companies would warrant a quarter of a million of messages being added to this number. Lord Hartington further looks to two reasons why there should be an important increase upon this description of messages; the first being the additional facilities that would be given for the use of the telegraph, and the second the reduction in the price of the message. It is also essential to remark that the additional facilities given for the use of the telegraph may be classed under three distinctions. There will be, in the first place, the creation of offices of deposit, so that every letter-box and every pillar-box in the kingdom will be a receptacle where messages can be sent to the nearest telegraph office to be forwarded to their destination. The next facility will be, we are informed, to connect the wires with the money order offices in every town and district, thereby bringing the telegraph into the centre of a population, instead of its remaining, as it frequently now does, in the outskirts. Then, again, the third facility is the extension in many places of the number of hours during which the offices will be accessible to the public. These additional facilities, it is estimated, will increase the business 15 per cent. And, once more to take up the official view of the case, we next come to the question of the reduction in the price of the messages transmitted. At the present moment, some messages are forwarded at 6d., others at 1s., the remainder ranging at an increased rate to 4s. The Government, however, propose to assimilate all messages to one uniform tariff of 1s. for twenty words, consequently it is believed, upon the sixpenny messages there will be a reduction, by reason of the increase of the price to 1s. of about twenty-five per cent. The 1s. messages will, of course, remain as they are at present, and it is estimated that the 1s. 6d. messages will be increased one-half or 50 per cent.; the 2s. doubled, or 100 per cent., and so on in proportion. It is necessary, again to follow the Government into figures, and in doing so we have the fullest assurance that the estimates quoted are not founded upon guess work, but framed upon the most careful and accurate calculations. For example (and it is necessary the closest attention should be given to the subject), it would seem that taking the number of telegrams as consisting of more than twenty words, each telegram is estimated to produce more than 1s. 2d., and at that price the estimated number of telegrams would yield a revenue of upwards of £510,000. Following then the calculations put forward by the Marquis of Hartington on behalf of the Government, it is distinctly stated—and a very important declaration it is—that all the railway companies have not been settled with. To a certain extent this is unfortunate. Arrangements have been made with the London and North-Western Company, and with some of the other principal lines there are good reasons for believing that profitable negotiations may be concluded. Of course it is fully understood that in the Bill now before Parliament clauses will be introduced giving a monopoly of telegraphic business to the Government, and it is anticipated that this proceeding will be not only remunerative, but, in course of time, be a source of considerable revenue. If, then, the proposed arrangements

are fully carried out during the present Session, 3,376 places will be served by telegraph instead of 1,822, and there will be 842 important stations created instead of 247 existing at present. It appears now there is one telegraph station to every 13,000 of the population, but if the Bill should pass, there will be one office to every 6,000 persons, an improvement and an advantage that cannot well be over estimated.

IRISH CIVIL SERVICE AND GENERAL BUILDING SOCIETY.

THE fifth annual general meeting of this society was held in the Molesworth Hall on the 10th inst.

ALEX. PARKER, Esq., J.P., in the chair.

The Secretary (Mr. A. H. Mercer) read the annual report, as follows:—

“The Society having now completed another year, the directors submit to you a report on their transactions during that period, and on the present financial position of the society. They also annex for your information a statement of accounts duly authenticated by your auditors, R. F. Young, Esq., and Henry M. Barton, Esq., after a careful examination made by them of the vouchers and books of the Society. A progressive and rapid increase in the receipts of the Society from all sources has taken place, especially in the year just closed. This increase will be best understood and appreciated by reference to the sum received in each year since the Society was established in June, 1864:—In the first year the receipts were £5,339 16s. 8d.; in the second year, £7,485 14s. 7d.; in the third year, £16,644 12s. 2d.; in the fourth year, £39,513 15s. 7d.; and in the fifth year (being the year ended 31st May, 1869), £60,746 13s. 3d.; showing the total receipts for five years to have amounted to the sum of £129,730 12s. 3d. The advances to members for building purposes, and for the purchase of leasehold and freehold property, which, in the four years ended in May, 1868, amounted to £51,103 10s. 9d., have increased to £95,728 4s.; and the amount of assets which, for the period referred to, amounted to £46,436 12s. 4d., has increased to £81,509 6s. 2d. In accordance with the resolution passed at the last Annual General Meeting, the securities of the Society have been valued at a discount of £7 per cent., and, therefore, represent the amount, without any profit, not repaid to the Society on account of each advance; and it is a matter of great gratification to the directors, that while in this way excluding from the balance sheet all profit not actually realized, they are able to report that the profits realized during the year, after meeting all liabilities, amounted to £3,813 14s. 11d., out of which they have paid the usual interest of £5 per cent. for the year, on all completed shares, and credited interest at same rate to partly paid up shares, and have also paid interest on deposits at the rate of £4 per cent., amounting together to £2,259 11s. 2d., leaving a surplus profit of £1,554 3s. 9d. Out of this sum the directors have declared a bonus of 2½ per cent.; thus giving a return to shareholders of 7½ per cent. per annum, free of Income Tax, and leaving £236 9s. 6d. to be carried forward to the credit of the current year's account.

The Chairman said when they last met the remarkable progress of the society was reported, and it was rather to be expected that, after such a bound as that from an income of £16,000 in 1867 to £39,000 in 1868, they should that day meet to say that a natural reaction had taken place, and that they had fallen back to £16,000. But, so far from that, he had the satisfaction now to announce that in this year the amount of receipts had increased to £60,000. He was happy to say that the gentlemen of the Civil Service had been found up to their work in this matter. He was constantly being asked—“Is the Building Society perfectly safe?” It was rather hard that the public would not look into the accounts, and to the persons who were on the directory, and judge for themselves. These questions were unpleasant because there was a sort of imputation in them that the directors had lent their names to an unsafe speculation. There were two or three leading principles which it would be well to bear in mind. The society bought nothing, sold nothing, and lent no money except upon mortgage. Before any money was lent, the officers of the society must be satisfied that no more was asked, or, at all events, that no more was lent than the security justified, and that a good margin was left for contingencies. It was also to be

* From the Broad Arrow.

remembered that every sum afterwards paid made the security better, because it diminished the debt without diminishing the security. The profits on the year had been about £1,500; and, with the exception of £230, which was put to the reserve fund, that sum was divided among the shareholders, giving a dividend of seven and a-half per cent. He was glad to say that the only loss upon these immense transactions was just £50, a loss smaller than, so far as he was aware, any kindred society had sustained in the same time. Everything depended upon upright management, and if they ever fell into incompetent hands, the sooner they dissolved the better. He begged to move the adoption of the report.

Mr. J. H. Owen, C.E., Architect to the Board of Works, seconded the motion. He said—They would observe, on inspection of the accounts, that the whole expenditure of the society, including income tax, on matters not purely reproductive, amounted to £803, which also included a sum of over £100 for a strong room. This was an economy of working which was most unusual, considering that they had received over £60,000. His attention had been called to a letter in a morning newspaper with respect to a bill which Sir Roundell Palmer had brought before Parliament, and which some thought would affect building societies. The first clause simply declared that the practice which had grown up with the growth of building societies—that of issuing full-paid shares, and of receiving deposits—was not contrary to the 6 & 7 Wm. IV., commonly known as the Building Society Act. The clause simply legalized a practice already in existence. The second clause was one of the most wholesome regulations that could be introduced;—it provided that a more full statement of the accounts of the company should be brought before the Registrar of Building Societies.

The motion was then put and adopted. There were two dissentients, one of whom protested against the amount of remuneration which had been taken by the directors.

W. Carte, M.D., J.P., and G. F. Dunn, Esq., were re-elected directors of this society.

Dr. Gardiner, of Belfast, proposed the following resolution, which was seconded by B. Banks, Esq., and adopted:—

"That the thanks of the meeting be given to the directors for their careful management of the society's affairs, and that they be authorized to divide among themselves annually a sum of £250 for their services."

Messrs. R. F. Young and H. M. Barton were elected auditors for the ensuing year.

Some alterations in the society's rules having been made, the proceedings terminated with a vote of thanks to the chairman.

DEATH IN A SEWER.

On the 4th inst. two men employed by the Corporation, lost their lives by suffocation whilst repairing and cleansing a main sewer at Benson-street, off Sir John Rogerson's Quay. Several scientific witnesses were examined at the inquest, their evidence being of a conflicting nature. Dr. Mapother, Medical Officer of Health, was of opinion that the poisonous gas came from the gas-works, while Professor Sullivan and Dr. Cameron, City Analyst, believed that the sulphuretted hydrogen—the cause of death—could only have been produced by the combination of the refuse from the gas-works with foreign acids from some other source. The jury, after an hour's deliberation, returned the following verdict:—That the said Wm. Loughnan was deprived of life on Wednesday, 4th August, 1869, at Benson-street, in the parish of St. Mark, city of Dublin, by inhaling the poisonous vapour called sulphuretted hydrogen gas, while engaged in cleansing and repairing the sewer in said street for the Corporation, in whose employment he was at the time; and that Wm. Loughnan lost his life in consequence of the Corporation not adopting the sanitary measures advised by Dr. Mapother some years ago." The same verdict, they stated, would apply to the case of James Collins.

NEW PULPIT

S. CANICE'S CATHEDRAL, KILKENNY.

In our present number we give an illustration of the new pulpit recently erected in S. Canice's Cathedral, Kilkenny.

It has been executed in a highly creditable manner by Mr. C. W. Harrison, sculptor, of 178, Great Brunswick-street, from a design by Mr. T. Newenham Deane, architect, under whose superintendence the works of restoration at this noble pile are being carried out, and drawing towards completion.

The pulpit is principally composed of Caen stone; it is octagonal in form, supported by marble columns, with carved capitals and bases. Each of the sides of the upper portion has trefoil arches, supported by Galway green marble shafts, and carved capitals and bases.

The cost was somewhat over £100.

THE IRISH VALUATION OFFICE.

THE Select Committee appointed to inquire into the working of the Valuation Department in Ireland, having concluded its sittings, has issued a preliminary report:—

That owing to the late period of the session, your committee are unable to present a report embodying their opinions upon the whole of the matters referred to them. They have, therefore, agreed to report the evidence to the House, together with the following resolutions, which were unanimously agreed to during the progress of the inquiry, and before the evidence relating to matters not embraced in those resolutions was concluded.

1.—That it is desirable that a careful examination of the books and accounts of the Valuation Office should take place in Dublin, with a view to ascertain whether any and what irregularities have taken place in charging upon the several counties, the expenses for which presentments have been made since the passing of the Tenement Valuation Act.

2.—That it is expedient that in future, before any presentment is made, the accounts of expenditure should be submitted to the Comptroller and Auditor-General, not only as regards their correctness with reference to the accountability of the officers, but with reference to their apportionment between the Treasury and the several counties, and that previous to any examination each county should have sent to them a detailed statement of the charge apportioned to such county by the Valuation Office, and the grounds thereof, and should have an opportunity of submitting their observations thereon, either in writing or through a person appointed on behalf of such county, to the Comptroller and Auditor-General.

Impartial and independent commissioners shall almost immediately proceed to Dublin for the purpose of examining the books and accounts of the Valuation Office, and early next session Colonel French, who has taken great interest in the whole question of the townland and tenement valuation, and devoted no small amount of time and energy to its elucidation, will move the re-appointment of the committee. Had it been determined to report this session, taking the evidence already given as conclusive, The O'Connor Don would have been prepared to submit, for the approval of his colleagues, the following series of resolutions:—

That the evidence received from the late and present Commissioners of Valuation as to the mode in which the tenement valuation was conducted is not consistent, satisfactory, or borne out by other witnesses.

That no reliable basis has been shown for the estimate furnished of the probable cost of a new valuation or of the percentage increase, which it is proposed should be placed on different counties under this new valuation.

That the description given by the Commissioners of Valuation of the duties performed in connection with the annual revision of the

tenement valuation is in many essential respects inaccurate, and the expense of that revision appears to have been excessive, the staff, especially of inspectors, being too large.

That the county of Dublin has been re-valued without any legal sanction, and that it is expedient that the expense of this valuation and the mode in which it was conducted should be investigated.

That all the expense of work done by the Valuation Office for private persons or for the Landed Estates Court should be borne by the persons interested in getting it done, and that no such expense should be charged to the counties or the Consolidated Fund.

That the Valuation Department requires to be reorganized before any new valuation is commenced.

ETYMOLOGY OF "CRANNÓG."

In the quarterly journal of the Historical and Archaeological Society of Ireland for January is printed a paper forwarded by the Rev. W. Kilbride, of Aran, Galway, in which he criticises the etymology of the word "crannóg" as furnished by Mr. Benn, and which appeared in a former part of the journal. The Rev. W. Kilbride writes thus:—

"Your 'Journal' for January contains an interesting account by Mr. Edward Benn, of various curious antiquities found in his locality. Towards the close of his paper, however, he indulges in some fanciful speculations respecting the etymology of a few Irish words. These I wish to notice, in hopes that hereafter some greater care may be paid to such matters; for if zeal masters discretion, and fancy is allowed to run riot, then antiquarian lore, which, if properly pursued, may lead to some useful result, will inevitably become the scoff of the unthinking and uncandid.

"Mr. Benn, too, I hope, will kindly forgive these remarks, as they are not intended for him in any way personally, but are simply directed against a system, long prevalent, of playing fast and loose with the poor old Irish tongue.

"Mr. Benn thus writes: 'On the subject of the meaning of the word "crannóg" I will make some observations. The first syllable, *cra*, signifies a dead tree—a tree lying on end, as opposed to *críve*, a living or standing tree; it signifies a log, a trunk of a tree, a stake. The second syllable is our word "egg," first applied to the shell of an egg used as a drinking vessel,' &c.

"We are thus informed, without the least show of authority, that 'crannóg' is a compound word, whose first syllable, *cra*, signifies a log, stake or dead tree, in opposition to *críve*, a living one. Now, with the greatest deference, I beg leave to deny that either of these statements, or definitions, whichever they may be called, is in any way correct.

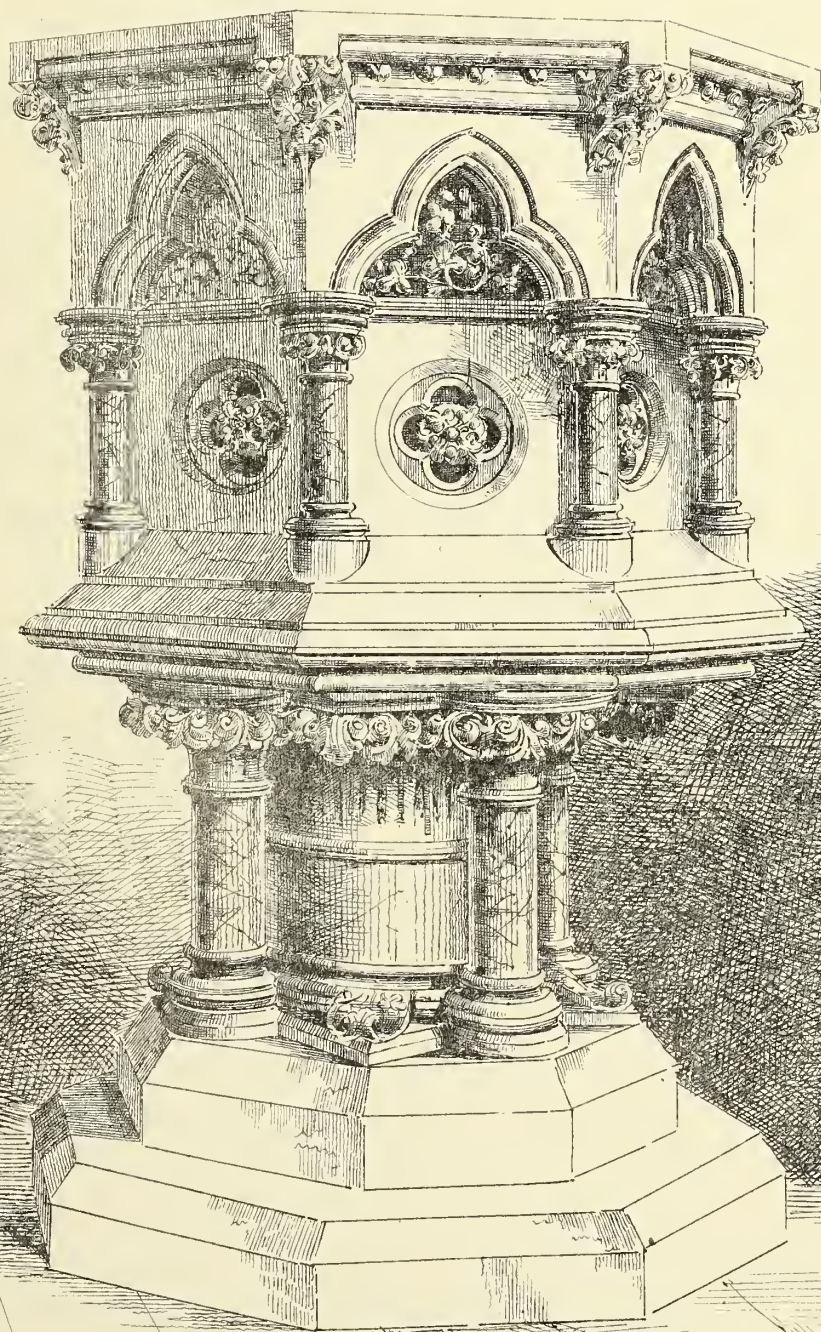
"Irish is a very figurative language—more so, perhaps, than any of our learned men have as yet even guessed. The original and primary meanings of the words have been partially, and are still being gradually, lost. In printed works and dictionaries, Irish words are translated by their supposed English equivalents; but the Irish student knows, by sad experience, how different this is to the fact. Two common words will easily explain this—*doimhne*, generally translated 'door,' and *coisil*. What is the meaning of this last word? Why, when an English speaker says 'rake the fire,' an Irishman, to express the same or a similar idea, says, *coisil an teiphe*; but not more diverse the words themselves than the sense conveyed by them. Now, *coisil* is the word employed in the Litany of the Irish version of the Prayer Book to translate the sentence, 'Spare us, Good Lord.' Mere Irish readers have been greatly puzzled with this word, and can by no means either account for its use or explain it; but had its original meaning been explored, they would have found it to convey the idea of 'preservation by covering over.'

"Thus 'crann' (always spelled with a double *n*) is generally applied to a tree with its branches and leaves, as *craib na coille*, trees of the wood. But its primary meaning refers to some massive object of timber, standing straight and erect, just as forest trees do.

"Hence, a vessel's mast is called 'crann,' as *craib-reóil*, from the material of which it is made, its erect position, and also size.

"From all this, it can be easily seen how far-fetched Mr. Benn's definition of this word is. It does not mean a dead tree, or log, or stake, but rather the contrary.

"No doubt 'crann' is often used in composition with other words, such as *raon-craib*, *craib-cábhail*, but in these instances it most commonly signifies 'wood.' *Saor* means any artisan except a worker of metals. When joined to *craib*, the idea of felling



NEW PULPIT, S^t CANICES' KILKENNY

C. W. Harrigan, Liverpool.

C. N. Deane Archt.

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timber, or a tree, is included with the further one of working it up afterwards; but it would be ridiculous to translate it as a log or stake-artisan.

"'Creeve,' Mr. Benn further states, is a living tree as opposed to a dead one. In this also he is very much mistaken. There is no opposition at all in the words. 'Creeve' (the common way of spelling it in English) is in Irish *crúab*, and simply means a small branch with other branchlets attached thereto. It is generally applied to oat branches, as *crúab coipe*, but seldom or never to the branches of a tree, which are called *seu*.

"The last syllable in 'crannóg,' Mr. Benn further states, is derived from 'ugh' (pronounced like the 'o' in *do*). Nothing but etymology run mad could arrive at such a conclusion.

"U5, an egg, there can be little doubt, is cognate with the English word egg; but Mr. Benn errs greatly when he tells us, 'this term was first applied to the shell of an egg,' &c. It has no reference, as far as I know, to either shell or shape. *blaor* is the Irish term for the former, and *u5* refers to the material, or substance contained in this *blaor* or shell. *O5* is the terminal form of hundreds of Irish words. Sometimes it carries the force of a 'diminutive,' but more frequently not. *Crannóg* is no doubt formed in the same manner as *cuaróg*, the name usually applied to a wild bee's nest, and derived from the noun *cuar*—any conical hollow,—with the diminutive ending, *o5*, attached thereto.

"In some country places the old kind of pulpits or forms was called *crannóg*, and in others, *crannghail*, or *crannghail*, a word of a somewhat similar meaning. This latter word, too, was the Irish term for a hurdle, and was commonly used for those wicker chimneys, so common formerly in country cottages. Mr. Benn, I hope, will thus see that his etymology for the word 'crannóg' will not stand the test of criticism.

"In another paper in the same 'Journal,' Mr. Atkinson, of London, supposes the word 'rath' means 'a place of assembly.' If he can give any proof, even a pregnant hint to that effect, it will be thankfully received."

The above criticism is followed by a communication on the same subject by Mr. J. O'Brien Crowe, which perhaps we may make room for in a future number.

DUBLIN AND DROGHEDA RAILWAY.

THE following is the report of the directors for the half-year ended 30th June, 1869:—

It appears that the net surplus, after providing for current expenses, interest on loans, and dividends on preference shares and stocks, is £17,801 14s. 9d., out of which the directors recommend a dividend on the ordinary stock at the rate of five per cent. per annum, less income tax. This dividend will amount to £16,120, and will leave a balance of £1,681 14s. 9d. to the credit of the current half-year. The passenger receipts during the past half-year show a decrease of £623 3s. 3d., which is accounted for by the visit, in the corresponding half-year, of the Prince and Princess of Wales. The goods traffic shows an increase of £778 6s. 10d. The accounts do not call for any special remark. The expenditure on revenue is of the ordinary character; and there has been nothing added to the capital account, except a sum of £124 6s. 4d. paid to the Irish North-Western Company, as contribution to the Clones and Cavan Extension. By the certificates of the company's officers, it will be seen that the line and rolling stock have been maintained in good order. The bill promoted by this company for the construction of a junction with the premises at North Wall, Dublin, of the London and North-Western Railway Company, has passed. The amount of capital which this company will have to contribute towards the expense of this undertaking is estimated at about £11,000. By the resolutions passed at a general meeting of the company, held 21st February, 1861, the shareholders created shares to the amount of £75,000 for the Kells and Oldcastle extension. Of that amount only £44,800 has been issued, and the directors propose, under the powers of the 16th section of the act now obtained, to issue so much as may be required of the capital which they were then authorized to raise, and to apply it to the construction of the said junction. The directors are happy to inform the proprietors that the four and a-half per cent. guaranteed stock has been readily taken. The accounts annexed show a total issue of

£69,910, in addition to which a further sum of £29,475 has been issued since the close of the half-year. Notices have been issued for the redemption, on December 31st next, of the remainder of the five per cent. shares, authorized to be redeemed by the resolution of proprietors of 27th February, 1868, amounting to £23,175, for which the company propose to issue the four and a-half per cent. guaranteed stock.

LABOURERS' DWELLINGS.

..... "Then, leaving the villa, Mr. G. C. Scott points out with great taste and moderation what the cottage should be. Judiciously, he does not aim at too much. It serves no good end to represent the *beau idéal* cottage as a building so costly to erect and to maintain, that landlords of ordinary means get frightened at the mention of so expensive a toy. Cottages may be built so as to be very tasteful and pleasing, while yet the expense of their erection is so moderate that labourers tolerably well off can afford to pay such a rent for them as shall render their erection by no means an unprofitable investment of money,—not, indeed, that a landlord who feels his responsibility as he ought will ever desire to screw a profit out of his cottagers; but it is well that it should be known that it need not entail any loss whatever to provide for the working class in the country dwellings in which the requirements of comfort and decency shall be fulfilled. The merest touch from an artistic hand is often all that is needed to convert an ugly, though comfortable, cottage into a pretty and comfortable one. A cottage built of flint, dressed and reticulated with brick, with wood frames and mullions, and the gable of timber, will look exceedingly pleasing. EVEN OF SUCH INEXPENSIVE MATERIALS AS MUD, THATCHED WITH REEDS, A VERY PRETTY COTTAGE MAY BE BUILT.

"The material MUD is one's ideal of the very shabbiest material for building which is within human reach. HOVEL is the word that naturally goes with mud; yet Mr. Scott once built a large parsonage, which cost between £2,000 and £3,000, of mud, thatched with reeds. Warmth was the end in view. I have no doubt the parsonage proved a most picturesque and quaint affair; and if I could find out where it is, I would go some distance to see it."—From "*Recreations of a Country Parson*."

A COUNTY SURVEYOR'S RESPONSIBILITY.

AT the recent Londonderry Assizes Mr. A. Tate, Surveyor of the County Antrim, was sued for damages by two persons named Hall and Campbell for injuries received by them on the morning of the 20th May last, which were alleged to have been caused by the negligence of defendant. Defendant pleaded that plaintiffs had by their own carelessness contributed to the accident. A man named Hewson had got a presentment to repair part of the road from Portrush to Portstewart; some rubbish and stones were left on the side of the road, and plaintiffs, whilst driving home at half-past two in the morning, passed over this heap and were upset. His lordship held that unless the jury were of opinion that plaintiffs had contributed to the accident, they should find for them, as he held the County Surveyor was responsible for the heap having been left on the road. His lordship reserved the consideration of that point for the court above. There was a verdict for plaintiffs, with £40 damages in Campbell's case, and £10 in Hall's. Both cases went to the jury at same time.

A MONSTER SAFE.

A WROUGHT-IRON safe of unusual dimensions, and presenting some novel features, has been manufactured for the Belfast branch of the Provincial Bank of Ireland, by Messrs Barnwell and Son, Bishop-street, Dublin, and as a specimen of workmanship in that peculiar department, we believe fully equals anything

of the kind yet produced. Its dimensions are as follow:—Width, 17 ft. 6 in.; height, 6 ft. 6 in.; depth, 4 ft.; and weight, 4 tons 11 cwt. It is divided into four compartments by upright partitions, each of these compartments being subdivided into three, making twelve in all. Each of the main divisions is guarded by a double door furnished with a lock the full size of the door, and also with two supplementary locks, acting upon and controlling the principal one, each requiring a different key, thus adding materially to the security of the contents. The entire workmanship reflects great credit upon the firm. We recently had an opportunity of inspecting the new premises of this bank now nearly completed in Hercules-street, Belfast. We hope soon to illustrate and describe them. The builders are the Messrs. Fulton.

NOTES OF WORKS.

New Church of the Immaculate Conception, Kingscourt, for Rev. P. O'Reilly, P.P. Cost, £5,000. Mr. Hugh Kelly, builder, Granard.

New Diocesan College for the Most Rev. Dr. Conaty, Lord Bishop of Kilmore, to be erected near the town of Cavan, on property recently purchased for the purpose, to cost £17,000. Plans being prepared.

New Parochial House, at Ratoath, County Meath, to cost £750, for Rev. J. Fulham, P.P. Plans being prepared.

Alteration and enlargement of Street Catholic Church, diocese of Ardagh, including new chancel and sacristy; cost, £550. In progress.

New Catholic Church, Swanlinbar, to cost £3,000. Plans being prepared.

Mr. W. Hague, F.R.I.A.I., is the architect for the above works.

CHRIST CHURCH, BRAY.—Towards the expense of erecting a reredos of suitable design in this church, two sums of £100 each have been promised by P. W. and W. H. Jackson, Esqrs. There is also in the hands of the Earl of Meath a sum of money for the same object.

The foundation-stone of a new church has been laid at Ballyconree, Connemara. The designs are by the architects to the Ecclesiastical Commissioners. The greater portion of the expense has been raised by subscriptions.

The Right Hon. the Earl of Portsmouth has directed Mr. George Ashlin to prepare plans for the remodelling of the interior of the Castle of Enniscorthy, and the complete renovation of the whole building. The exterior architecture of this splendid castle—one of the finest in Ireland—is still in good repair, the arch-destroyer, Time, seeming only to have added additional beauty by the venerable greyness of its massive walls and lofty battlements. It is situated in the centre of the town, on the hill, on which much of it is built. No doubt it will be of great advantage to Enniscorthy, the annual sojourn of his lordship and family on this (henceforth to be) their Irish residence.

The Right Hon. Earl Russell has arranged with Mr. Francis Nutty, Mullingar, for the erection of a new hotel and other important works at Navan, Co. Meath. The plans have been prepared by Wm. F. Calbeck, Esq., architect, Dublin. The cost will be nearly £4,000. The hotel will, it is expected, prove a great desideratum in this prosperous town. Ample accommodation in the way of stabling, out-offices, &c., is projected. To the members of the Meath Hunt Club particularly it will be of the greatest advantage.

An armour plate supplied by Sir J. Brown and Co. of the Atlas Works, Sheffield, and selected from a batch intended for the armour of the *Swiftsure*, now building, was tried on board the *Comet* target ship in Porchester Creek, Portsmouth Harbour, on Tuesday last. The extreme length of the plate was 16 feet 6 inches; width, 3 feet; thickness, 6 inches; and weight about 5 tons. It was secured by sixteen two and a-half inch bolts, with ordinary nut and screw, to the backing in the testing battery.

L A W.

WATERFORD CITY COURT.—JULY 28th.
(Before Mr. Justice George and a Common Jury.)

David Moran v. Eliza J. Knox.—This was an action (as stated in our last) to recover £447 10s. 5d., alleged to be due for work done and materials provided by plaintiff for defendant, for money paid on her behalf, and also for money allowed to be due on account stated between them. The defences were that no work was done, no money paid by plaintiff for defendant; that the work done was to the value of £420, and that that sum had been paid.

Mr. Harris, Q.C., stated plaintiff's case. Defendant having taken a plot of ground in Barker-street, Thomas's-Hill, decided building eight houses thereon. She made an arrangement with a builder named M'Kenzie to do them. M'Kenzie became unable to do the work, and defendant proposed to plaintiff to carry out M'Kenzie's arrangement, and he did so in March, 1868, and built seven houses for £400, and on M'Kenzie's specification. When Moran engaged to do the work he was not aware that the ground sloped at the back, and he was compelled to make a levelling of from 6 to 7 feet, and totally independent of the contract for £400. Miss Knox asked him to make certain alterations, which he did. The work had been commenced, and money paid on account, when negotiations were entered into, and an agreement made on the 6th of July that no extra work should be done unless under the authority of John Walsh, whom Miss Knox had appointed her inspector and architect. Extra work in levelling the ground had been done before the agreement was signed. Miss Knox subsequently wrote to him to change the windows in the rear. Subsequently Moran passed a promissory note for £400, for which Mr. W. K. Commins was security, for the due performance of his work. About a week after entering on the contract, Miss Knox wanted another storey added to the houses, to make them three-storey houses, and an agreement was made, through Walsh, with Moran to do this for 8s. 6d. a perch, with incidentals. Subsequently the brother of defendant, Mr. John Knox, made an agreement (with Miss Knox's knowledge) with plaintiff to do all this for £100. The work went on, and certificates were duly handed in by Walsh for the work done up to the 24th of December, when at that date it was intimated to Moran that Walsh's services had been dispensed with. Matters then came to a stand still, and the Rev. George Commins was spoken to to settle the differences. He made arrangements between Moran and Miss Knox, that certain things were to be done, and Moran was to get £250 in payment of all claims. There was £180 due on the other two arrangements, and he was to get £70 for extras. Miss Knox went back of her word subsequently, but it was ultimately arranged that £235 was to pay for all. Two sums of £50 were paid on that, leaving £135 due to the plaintiff. It would be proved that extras were executed on the works to the amount claimed. On the 10th of May following Mr. Delandre sent a notice to Mr. Moran, requesting him to finish the houses within a week. Moran replied that he considered the work finished, and expressed his willingness to do any little matters that they might consider necessary; and when he went, he found the houses had been broken into, and possession taken by Miss Knox. He would ask them to give the full sum sought for.

The plaintiff, examined by Mr. Purcell, Q.C.—Early in 1868 he agreed verbally with Miss Knox to build seven houses in Barker-street, on a specification made by Mr. M'Kenzie, and on his own estimate, and under the superintendence of John Walsh. Had to make an alteration, owing to a fall in the ground, when the joists for the first floor were being put in; the first mention was made of a written agreement, and an agreement was signed in July in presence of

Mr. Delandre; Miss Knox had promised him £30 on account of the work, and he had already got £40 from her; agreed to do the work for £400, and they were to be two-storey houses; got £200 on account of the work; a fresh arrangement was made with Miss Knox to make them three-storey houses, and Walsh agreed he was to get 8s. 6d. a perch for the masonry, and certain sums for the fittings. [Counsel read a letter from Miss Knox, expressing her satisfaction at the arrangement.] Mr. John Knox called on witness subsequently, and it was agreed that £100 was to be given for the extra storey [another letter was read from Miss Knox acknowledging this contract]; raised the third storey, and got £50 on foot of that agreement [receipt handed in for £40 on account of upper storey, dated 16th July]; Walsh inspected the work till December, 1868 [letter to that effect from Mr. Delandre]; Walsh had given certificates for the work so far; when Walsh was dismissed, the houses were nearly finished; went on with the work, and Miss Knox sent kitchen ranges, and witness refused to set them, as he had grates set according to specification; stopped work then, and asked her for money; she refused to give it; there was a dispute about the ceilings; before Walsh was dismissed saw the Rev. George Commins, and told him he would complete extra work for £250, including the £180 balance due; in the first agreement Miss Knox objected to it as being too high, and witness agreed to take £235 for all; did all the work with reasonable despatch; about a month ago, sent to Miss Knox about the flooring in the kitchens; they were not in the specification; got notice from Mr. Delandre, and then offered Miss Knox the keys [note from Mr. Delandre, 10th May, handed in, giving witness a week to finish the work]; sent back notice that he considered them finished, and asking them to meet him at the premises; went there and saw a woman in one house, Miss Knox in another, and a notice up, "No trespassers allowed!" Miss Knox's sister said defendant could not be seen as it was the "Queen's birthday!" got a note from her for the keys, and sent them; considered the houses were finished then; before signing the agreement of July they required me to get security, and Mr. W. K. Commins joined me in a promissory note for £400 as security; got two payments of £50 from Father Commins on foot of the new agreement with him; gave receipts, and they were returned by Mr. Delandre, stating he would not take these, as the words "new agreement" were in them; put three additional rafters in each roof, and Miss Knox promised 3s. a house; told Miss Knox the specification was a bad one; saw the outside of the houses before agreeing to do the work, but did not go through them; thought the ground was level; told Walsh the price of raising the back wall would be £20, and he said it should be paid.

His lordship at this juncture suggested an arrangement. He said it was agreed on by all parties that the total of the three arrangements was £555, and that £420 was paid on foot of it, leaving £135, and the defence was that the works were incomplete to that extent. He considered that any respectable builder would be able to decide the question to the satisfaction of all parties.

A discussion took place with a view to settle the matter, and his lordship asked would the defendant pay £100 in full of all claim? She refused.

Mr. Purcell examined plaintiff as to the items in the account for extras.

Cross-examined by Mr. Hemphill—There was no specification at first interview; wrote one that night [document produced, dated April, 1868]; it was intended that eight houses should be built; the estimate was for seven houses, at £400; could not swear that that document was not copied from M'Kenzie's specification; proposed on the 1st May to build seven according to M'Kenzie's specification; told Miss Knox it would be better not to go on it; said to Mr. Delandre before the agreement of July 6th was signed that

there was extra work done, and he said I should be paid for it; used river water in making the mortar; Miss Knox and others complained of it; mortar made of salt water is as good as any other for building; there was timber left behind the chimney-piece; am not aware that they are likely to take fire; never heard the insurance offices would not insure such houses.

Rev. G. Commins examined by Mr. Harris, Q.C.—Became acquainted with Miss Knox in January last, by her calling upon him; she complained to him about not getting up her houses from defendant in proper time, and he interfered between the parties to try and arrange matters; called upon Mr. Delandre, who told witness he would not make any proposition towards a settlement; witness afterwards met Moran, and told him what Mr. Delandre had said to him; the result of the conversation was that Moran undertook to do all, including the extras defendant put upon him, for £250. He added, "Let any builder in Waterford value the work on the premises, give his award, and I will be satisfied to take 10 per cent. off that valuation." Witness told this to Miss Knox, and it was ultimately agreed both by plaintiff and defendant that on the payment by her of £235 the whole thing was to be at an end.

Court—Surely after that there can be no controversy in this case. There could be nothing more sensible than the arrangement made by this gentleman, and it is idle to take up the time of the court any further on it.

Mr. Harris said that after that expression of opinion the plaintiff would not go further.

Mr. Anderson said his client wished an opportunity of making an explanation.

Court—Does she mean to contradict the evidence of Mr. Commins?

Mr. Anderson—Oh, no, my lord, but to give an explanation.

Court—It is idle to go on further. I am not to sit here to be trifled with in this manner.

Mr. Anderson—My client, my lord, wishes to state that the houses were not given up to her in time.

Court—That fact has been condemned by the conduct of defendant herself, and it cannot be carried further.

Mr. Anderson said he would exercise his discretion in the matter, and under the circumstances now disclosed, he would not address the jury.

Mr. J. T. Ryan, T.C. (for plaintiff), builder—Examined the houses, and considered the work was executed in a fair manner suited to the class of houses mentioned in plaintiff's contract, and nothing was left undone by the contractor, so far as witness could judge by the specification, which was very imperfect.

Mr. M'Kenzie, also a builder, was examined for defendant, and took exception to the manner in which some of the work was executed.

Under the directions of his lordship, and with their own expressed concurrence, the jury found for plaintiff, giving £135 damages and costs.

CORK CITY COURT.

(Before Mr. Justice O'Brien.)

Barry v. O'Flynn.—This was an action by Mr. W. B. Barry, 27, Patrick-street, against Mr. T. O'Flynn, builder, to recover damages for injury to plaintiff's house by, as alleged, the negligence of defendant in building a neighbouring house.

Counsel for plaintiff—Messrs. Butt, Q.C., Murphy, Q.C., and Johnston, instructed by Mr. Julian. For defendant—Messrs. Waters, Q.C., and O'Brien, instructed by Mr. Blake.

Mr. Johnston opened the pleadings, and Mr. Butt stated the case.

The plaintiff was examined by Mr. Murphy—Had been residing in the house in question since December, 1867; remembered when defendant commenced to build the house No. 20; portions of the old house were pulled down by means of ropes; observed that its pulling down had an effect on his house; in December, 1868, the scaffolding of the new

house fell, and brought the cornice at the top with it; witness felt the effects of that fall; on that night he took his family out of his own house and kept them in lodgings for three days; on the day of the occurrence his shop was closed; got Mr. Evans, builder, to examine his house, and by his direction the wall of the house facing Robert-street was propped; since the pulling down and rebuilding of No. 29, the plate-glass windows and pillars in witness's shop went crooked; since the rebuilding, too, the wall fronting Robert-street has bulged out, and from the inside of the house a separation has taken place between the flooring and the side walls; since those changes the business of the shop has been affected; on a subsequent occasion, being afraid to remain in the house, witness was again forced to leave it for seven days: when getting into the house originally, witness paid £150 for it, and has since laid out £130 on it; previous to the commencement of the work at No. 29, nothing was observed about the house to cause any alarm or uneasiness whatever; in witness's opinion the house is not at present safe to live in.

Cross-examined by Mr. Waters—Was not living in the house when the Munster Arcade was rebuilt in 1865; did not put plate glass in the house myself; never got the house examined by an architect, because I did not see any need of it; never got it plumbed; there is but one metal pillar supporting the house at the corner of Robert-street; put up the props under the direction of Mr. Evans; two props were knocked down, and as there were four put up originally, only two were allowed to remain up; neither of them was knocked down by the wind.

Miss Emily Clements, an assistant in Mr. Barry's establishment, corroborated his evidence as to the effect of the pulling down and rebuilding of the new house on the door, windows, and pillars of their shop.

Other evidence of a corroboratory nature was given.

Mr. Wm. Barnard, builder, deposed that he knew the houses in question; made an examination of Mr. Barry's house lately; it is in an unsound state, and not safe to live in; the lower part of the building from the shop window down had gone over; the top had also gone, but not so much out of perpendicular; props on the Robert-street side were absolutely necessary, but they would not make the place secure; the filling in between the walls of the new building and the next house has the appearance of a wedge shape; that would naturally have the effect of pressing against the old houses in the settlement of the new works; both Nos. 27 and 28 appeared to have gone over towards Robert-street together; both houses must come down; a small outlay on them would be useless. The general effect of the building of Munster Arcade was to produce a general inclination of Mr. M'Kenzie's house (then Mr. Roche's) towards those houses and towards Robert-street; the foundation of the whole line of houses there is very insecure; nearly all the flat of the city is built on a bog; Mr. Barry's house is a very old one; the taking down of Mr. Roche's house would scarcely relieve the pressure against the other house; in general it is more secure to let old houses stand together; there is a vacancy between the new part of the wall of No. 29 and the old wall at No. 28, at least at the second floor where I made the examination. I should say the house was built with all care. Considering the period of the year, I would say it was ran up in too short a time. I consider there is danger arising from the entire length of Robert-street, but I think the immediate point of danger is at the corner of that street; consider one metal pillar a sufficient support for that under ordinary circumstances, if it was properly built, and upright; from the way I first saw the props put up against the house I thought they were of no more use than so many walking sticks (laughter), but I understand they have been changed since.

Mr. P. Roddy, civil engineer, in answer to Mr. Murphy, deposed that the house in question was not safe to live in; the taking away of one of the three houses would have the

effect of lessening their chance of sticking together; the longer and larger a block, the less danger of any one of the houses composing it falling.

Mr. Waters, Q.C., stated the case for defendant, which was in substance that previous to the taking down of the old and the erection of the new building, Mr. Brash, architect, directed it to be plumbed, when the side wall of Miss Skillen's house was found to be 16 inches out of plumb from the base to the top. Therefore no injury could have been done by the erection of the new house; on the contrary, the taking down of the old one relieved Miss Skillen's house, through which only the injury could have been communicated to plaintiff's house. The appearances described by the witness examined for plaintiff must have been caused by the putting in of a plate glass front in Robert-street, and taking away the old wall, which was the main support of the house.

Mr. R. R. Brash, architect, examined by Mr. O'Brien—Was the architect for the house 29; when taken down the house was in a very dilapidated state; it was leaning towards Miss Skillen's house, the wall being eight inches out of plumb from the lead upwards; no injury could happen to Mr. Barry's house through the building of Mr. M'Kenzie's house, except it was communicated through Miss Skillen's house; so far as regards external appearance Miss Skillen's house is in the position now as it was for many years past; both Barry's house and Skillen's house have had an inclination towards Robert-street as long as I know them; the eastern wall of Mr. M'Kenzie's house does not touch Miss Skillen's house anywhere; was very cautious about that; there are several inches between them, and M'Kenzie's wall is perfectly perpendicular; the removal of Mr. Roche's house, where Mr. M'Kenzie's house now stands, relieved Miss Skillen's house of a great weight that pressed against it; never saw any builder execute a contract with so much care or so much solicitude to avoid injury to the adjoining house as was shown by O'Flynn; there was no injury whatever done to Miss Skillen's house by the erection of Mr. M'Kenzie's house, and no injury could have been sustained by the plaintiff's house, except through Miss Skillen's house; the scaffolding fell in consequence of a portion of the cornice falling after a heavy fall of rain and during a gale wind; no ordinary foresight could have prevented that occurrence.

Cross-examined by Mr. Murphy—Miss Skillen got £40 from defendant after the cornice had fallen; that was not solely as compensation for damage caused by the falling of the cornice; she complained of trespass also, and of loss of business; defendant gave her the £40 in order to avoid litigation.

Mr. Henry Hill, C.E., deposed that he examined Miss Skillen's house on the 10th of October, on the part of John B. M'Kenzie and Co.; the eastern wall of Mr. Roche's house was 16 inches out of plumb in a height of 36 feet; it inclined towards plaintiff's house; examined Miss Skillen's house since M'Kenzie's was built; the shop front and the bay windows were out of level; could not state what was the cause of that effect; it was a very injudicious thing in witness's opinion to have put a pillar under plaintiff's house in Robert-street.

Mr. Charles W. Atkins, architect, was examined in corroboration of Mr. Hill's evidence. The subsidence in plaintiff's house was caused by the sinking of the pillar, and on the whole, the substitution of Mr. M'Kenzie's house for Mr. Roche's improved Miss Skillen's.

Mr. Richard C. Bourke examined by Mr. Waters—I believe you are an architect of experience?—I am only a builder. But you are a builder of experience?—I believe so; I plumbed the new wall three days ago, and it was perfectly level. Are you able to tell in what condition the old wall was?—I have been in the habit of repairing it for the last twenty years, and it was in the same condition as it was when the Arcade "busted over" (a laugh). What is the space between the walls?—About 15 or 16 inches; the dividing wall

was built by a Limerick or Dublin man—I am happy to say he was not a Cork man; the superstructure bent it over. Are you acquainted with Miss Skillen's bay window?—I am, for I did many a job for it. Was it out of level before M'Kenzie's house was erected?—It was, and for years before that.

Cross-examined by Mr. Murphy—Are you a well-known builder?—Yes, my lord—sir, I mean. And you are commonly called "Dick the Sublime," or "Bourke the builder"?—"Dick the Sublime" (laughter). And you have been tinkering at these premises?—Yes; the house is a very old one. The Munster Arcade played the mischief with it?—It did, indeed; the man that built it was a Belfast man, thank God! (laughter).

Mr. Robert Walker, jun., deposed that he considered Miss Skillen's house had been relieved of pressure by the way in which the eastern wall of the new building had been erected; believed the injuries to Mr. Barry's house had been caused by the subsiding of the foundation.

The evidence on both sides having closed, his lordship charged the jury, who after short deliberation found for defendant.

CORRESPONDENCE.

STREET RAILWAYS.

TO THE EDITOR OF THE IRISH BUILDER.

SIR,—Will you kindly permit me to bring before the notice of our fellow-citizens a subject which has, I believe, lain dormant since the 'redoubted' George F. Train's abortive attempt some years since. I allude to the introduction of street horses cars running on rails. Since Mr. Train's time a new rail has been generally adopted in the United States, which, rising no higher than the street level, interferes but little with the ordinary traffic. I have been informed the Londoners are about laying them down, and we must soon follow. For the benefit of those who may feel disposed to undertake an enterprise so certain to succeed, I may furnish, in a short space, some particulars of interest on the subject, which I obtained during a recent tour in the United States.

In all cities in the States of over 100,000 inhabitants, and in many of even less, these horse car railroads have been laid down, and I have not yet heard of any company which has not pecuniarily succeeded. Baltimore is about the same size and has about the same number of inhabitants as Dublin. Like our beautiful city, it is situated upon undulating ground, and, with the broad bosom of the Chesapeake on one side, and a magnificent park of noble timber on the other, the bird's-eye view from the far-famed Washington Monument indicates suburbs nearly as attractive as our own. Mr. Henry Tyson who is president of the Baltimore Horse Car Company, and, indeed, himself much the largest shareholder, kindly afforded me the following particulars touching the management and results of the street railway system in that city. Like every improvement which affects trade or class interests, as its introduction, it encountered violent opposition; the rails were torn up and the carts destroyed; but the promoters persevered, until the advantages of such cheap and easy locomotion became so apparent that within ten years the company has been repeatedly petitioned to extend its railway system to various streets and suburbs where its want was felt.

There are at present 38 miles of street railroad in Baltimore, over which 64 cars run every day in the week, carrying each an average of six passengers to the mile, at a cost for adults of 2½d., and for school children 1½d. for each direct trip. Transfer tickets, costing 1d. additional, enable the holder to continue his journey on cross lines without further payment.

The total number of miles run in the year 1868 was 1,709,952, and the number of passengers carried 10,200,372; and yet there was not a single accident occurred involving personal injury to anyone during that year. Mr. Tyson trains his own conductors, will

not hire any who have not first-rate characters for sobriety and steadiness, and who have ever been engaged on other roads, as he does not altogether approve of the system in many other cities, and does not want the trouble of untraining. The cost of laying the rails in Baltimore, where both iron and labour are much higher than here, was about £1,650 per mile. They have a constant stock of 500 horses and 80 cars, including about 8 double-decked cars, the value of the entire plant not much exceeding £100,000. The loss in horses is not over 25 per annum. Comparing the two cities, Dublin and Baltimore, nearly equal in area and population, I am I think quite safe in predicting that a company with a capital of say £100,000, as well managed as that in Baltimore, would yield a dividend of 15 per cent. charging no larger fare than 2d. each direct trip. The value of suburban property would be enormously enhanced, and the sanitary condition of the city improved, and the toiling denizens of our alleys and back courts enabled to breathe fresh air, and enjoy at least one day's recreation in the week.

The advance in our cab fares renders an agitation on the subject of street horse cars on rails at present not ill-timed.

W. L. BARRINGTON.

MISCELLANEOUS.

A very interesting and scientific production has just issued from the pen of Mr. J. Scott Moore, entitled "Preglacial Man, and Geological Chronology." The author appears on the whole to be a disciple of Hugh Miller.

The gold medal of the Royal Agricultural Society of Ireland has been awarded to Mr. James Byrne, Wallstown Castle, for the best Essay on Dairy Management.

We are informed that Mr. Eugene O'Kavanagh, who some years ago offered himself as a candidate for Wexford borough, is preparing a work on "The Mines, Metals, and Mineral Resources of Ireland." He is very competent for such an undertaking. The Rev. Charles Gibson, author "The History of Cork," is said to be preparing an historical work on "The Province of Munster."

The prize of £4,000 offered by Napoleon III. for the completest work of art—art being taken in its broad sense—executed in France within the past five years, has been allocated at last. There were nine serious competitors; among painters, Baudry, Cabanel (one of the best landscape artists of the French school), and Hesse; among sculptors, Guillaume, Gumery, and Perraud (the creator of a delicious "Infancy of Bacchus"); and among architects, Garnière (who is engaged on the new Opera-house), Lefuel, (who has added the wing to the Tuileries connecting it with the Louvre) and Duc, from whose designs sprang up the new Palais de Justice. The last is the lucky man. There were no less than 11 different resources to the balloting-urn before the issue of this latest "judgment of Paris" could be determined. M. Garnière, if his work were finished, would have, in all likelihood, carried off the prize; and he it is, with admirable good taste, who is the first to acknowledge that it is the honest due of his successful rival.

The friends and admirers of Dr. McKnight, editor of the *Derry Standard*, have presented him with a service of plate and a purse containing 600 sovereigns, as a token of their confidence and regard, and in testimony of their appreciation of the integrity which has characterised his public life during a period of forty-two years, since he first became connected with the Press.

The choir of Exeter Cathedral is to be restored by Mr. Gilbert Scott, at a cost of upwards of £12,000, towards which the Chapter subscribes £3,000; the Bishop of Exeter, £1,000; and the Dean, £1,000.

At the show of the Royal Agricultural Society of England, just held at Manchester, a prize has been adjudged to Messrs. M'Farr, of Belfast, for their patent circular roof felting.

A large export trade in ice is carried on in Norway. It appears that a company has purchased an extensive lake, surrounded by mountains, in the neighbourhood of Drobak, on the Gulf of Christiania, and, to insure the perfect purity of the water from sewage, has even bought all the houses that stand on its shores. Each winter the ice, which frequently attains a thickness of two or three feet, is cut by a kind of plough into long strips, and subsequently sawn into blocks weighing from three to five hundred weight. In this form it is shipped for export, and, in properly constructed cellars, can be preserved for so long a period that a large portion of the ice now sold in London actually

arrived there in 1866. Besides the regular ships belonging to the company, many vessels accidentally frozen up in the Norwegian fjords leave in the spring with cargoes of ice. By far the largest trade is carried on with England, which, in 1865, took 44,055 tons, out of a total of 45,593 exported.

The external restoration, or rather rebuilding, of the Chapter House Westminster Abbey, is now, so far as regards the larger features of that work, almost finished. The wooden part of the roof is placed, and has yet to be covered against the weather; the parapet has been renewed throughout, also the flying buttresses and the detached pieces on which they rest, a new buttress and pier have been erected in the space which is in front of the entrance at Poets' Corner, so that approach is now had to the Abbey in that quarter under the lofty flying buttress of this pier. The new external works look remarkably well; so far as they are concerned the Chapter House is a new one. The internal works are being carried on with energy; we may shortly take an opportunity of adding to our former remarks on this very interesting work. The exterior of Chapter House was until recently so completely defaced that no objections can be urged against its rebuilding. It is now a fine piece of architecture.

An enterprise of considerable magnitude has been undertaken by the great millionaire, A. T. Stewart, of New York, in the purchase of 7,500 acres of land on Long Island, known as the Hempstead Flats, for the purpose of laying it out in villas and ornamental grounds. The land was a common, affording a scanty pasturage for vagabond cattle, and belonging to the Corporation of Hempstead, which had been importuned to sell it by other applicants, some of whom offered a higher price than that paid for it by Mr. Stewart. His bid was 55 dollars an acre, and he was awarded the land by a vote of the citizens of the town. Having paid for the property in a cheque for 412,500 dollars, Mr. Stewart will proceed to improve it at once by carrying wide avenues through his eleven square miles, and erecting along them mansions for the occupancy of the business men of New York. Boulevards, shade trees, and fountains will adorn and diversify the wide area. Model dwellings for people of moderate incomes will occupy one section, while the cottage ornee and the Italian suburban residence will make beautiful another. Millions, of course, must be spent in accomplishing all this, but the project is not by any means an eleemosynary one, for in less than ten years the return for the expenditure will be fourfold. Hempstead is but twenty miles distant from New York, and the demand for dwellings within that radius of Wall-street is already so great that all the waste spaces and barren heaths of neighbouring New Jersey are rapidly filling up with handsome villas. Failing to get into the Cabinet of President Grant, by reason of the disability of trade, Mr. Stewart has turned his mind to several large schemes of public utility and benefaction. He is building at this moment an immense hotel for working women, at a cost of six millions of dollars. This vast caravanserai is at the extremity of Fourth-avenue, from 32nd to 33rd Streets, and will be 192 feet by 205 feet in area, and eight storeys in height. It is estimated that 1,500 working women will be furnished with comfortable homes here at a charge not exceeding 2 dollars a week, which will be a great blessing to them, while the outlay will prove no bad investment for the capitalist, since an enormous sum in rents will accrue from the elegant shops, with fronts of French plate glass, and wide accommodation for the display of fine goods, which will wholly take up the basement and first story. That Mr. Stewart is doing an excellent service to the city, both in this home for working women and his reclamation and ornamentation of the Hempstead Flats, there can be no question whatever, but the benevolence is not altogether disinterested, for in no other way could he more profitably put at interest his immense fortune.

Artists, architects, land-surveyors, and all who have occasion to make use of tracing-paper in their professional duties, will be glad to know that a new method has been promulgated by our clever neighbours across the channel, for rendering any paper capable of the transfer of a drawing in ordinary ink, pencil, or water-colours, and that even a stout drawing-paper can be made as transparent as the thin yellowish paper at present used for tracing purposes. The liquid used is benzine. If the paper be damped with pure and fresh-distilled benzine, it at once assumes a transparency, and permits of the tracing to be made, and of ink, or water-colours, being used on its surface without any "running." The paper resumes its opacity as the benzine evaporates, and, if the drawing is not then completed, the requisite portion of the paper must be again damped with the benzine. The transparent calico, on which indestructible tracings can be made, was a most valuable invention, and this new discovery of the properties of benzine will prove of further service to many branches of the art profession, in allowing the use of a stiff paper where, formerly, only a slight tissue could be used.—*Once a Week*.

THE IRISH SOCIETY IN LONDONDERRY.—A numerous deputation from the Hon. the Irish Society are paying the annual visit to Londonderry at present. The members are showing every desire to make themselves acquainted with the wants and requirements of the district. We understand that they are pledged to recommend the erection of a pier at Culmore, the granting of £20,000 for the building of a new hall for Derry; £1,000 for the erection of a building to accommodate the Academical Institution; and £60 to the City of Derry Boating Club, £10 of which are to be expended on a cup for competition at the regatta, and the remaining £50 to be added to the fund for the erection of the new Club House.—*Derry Guardian*.

The cry is everywhere, "Cut it down!" The authorities at the War Office have seized upon the item of advertisements as one which requires "cutting down," and are prepared to enforce strictest possible economy in regard to them. They are to be drawn in as terse a style as possible (by which a small saving will also be effected in the article of quills), and, except in special cases, the number of insertions will be limited to two or three. When more than one insertion is ordered, care is to be taken that a second insertion in the same paper is to be avoided, unless any special reason exists for the adoption of a different course; and whenever it may appear expedient to insert an advertisement more than three times, the sanction of the Secretary of State at home, or general officer commanding abroad, must be first obtained for the additional insertions.—*Broad Arrow*.

HOUSES OF PARLIAMENT AND GOVERNMENT OFFICES, SYDNEY, NEW SOUTH WALES.—Government Offices and Parliamentary Buildings are now in course of erection in the Domain, Sydney, from the designs of Mr. W. Henry Lynn, of Belfast. The cost, it is estimated, will be about £650,000. The building is divided into two main blocks,—the Government offices and Parliamentary buildings. The Government offices are placed on the west, towards Macquarie-street, as this site affords more ready access at different points, from the direction of the city. The main entrance, which forms also a general entrance to the entire buildings, is placed in the centre of this front, with additional entrance, besides angle towers; by which, and the arrangement of staircases and corridors, any one of the departments may be approached directly without passing through others. The offices of the chiefs of principal departments are placed on the ground-floor, the subordinate offices above. The Parliamentary buildings—occupying the eastern portion of the site—are divided from the Government offices by two spacious court yards, direct communication, however, being preserved on the level of the upper by staircases connecting both blocks. The principal entrances to the chambers will be from these courts. The ground-floor of the large tower—besides the state entrance—will form a state chamber; the upper portion of the tower will be available for fire-proof rooms for records. Sandstone of a good quality is available as a building material; in fact, the foundation of the structure is sandstone, which is found at a depth of about 5 ft. below the surface.—*Builder*.

GOLDSMITHS' WORK.—The progress of fine art manufacture in this branch of trade is strikingly exemplified in a little work published by J. W. Benson, of 25, Old Bond Street, and of the City Steam Factory, 58 and 60, Ludgate Hill. It is enriched and embellished with designs (by Italian, French, and English artists) of Brooches, Bracelets, Earrings, and other articles, suitable for personal wear, or Wedding, Birthday, or other presents, with their prices. Mr. Benson (who holds the appointment to H.R.H. the Prince of Wales) has also published a very interesting pamphlet on the Rise and Progress of Watch and Clock-making. These pamphlets are sent post free for two stamps each, and they cannot be too strongly recommended to those contemplating a purchase, especially to residents in the country or abroad, who are thus enabled to select any article they may require, and have it forwarded with perfect safety.

ERRATUM.

Through inadvertence in our printing office, to the paper by Cave Thomas, Esq., the footnote stating that it was "Extracted from the *English Mechanic*" was omitted.

TO CORRESPONDENTS.

Messrs. Williams and Co., Glass-house-street, Regent-street, London, are respectfully informed that for such miscellaneous advertisements as do not come through an advertising agent, we require payment in advance; this system saves us a deal of trouble with small accounts. Our charge for six insertions would be 15s.

All Communications respecting the IRISH BUILDER, should be addressed to MR. PETER ROE, 42, Mabbot-street, to whom all payments for Subscriptions and Advertisements must be made.

RATE OF SUBSCRIPTION TO THE IRISH BUILDER.

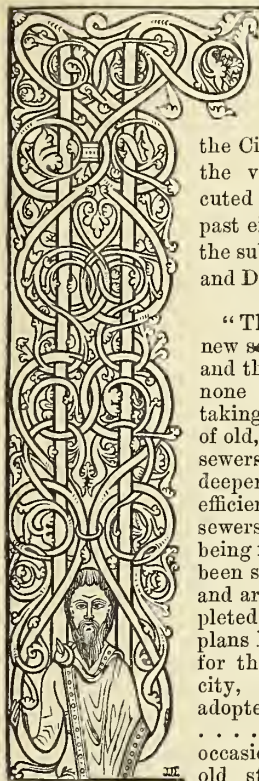
YEARLY (delivered in the city and circuit) ... 6s.
" " by post ... 8s.

* Payable strictly in advance.

The Irish Builder.

VOL. XI.—No. 233.

Public Works in the City.*



IN this very voluminous Report (to which we should have adverted long since) the City Engineer details the various works executed by him during the past eighteen years. On the subject of "Sewerage and Drainage" he says:

"The construction of new sewers in the streets and thoroughfares where none had existed; the taking up and rebuilding of old, bad, and inefficient sewers; and the repairing, deepening, and making efficient such of the old sewers as were capable of being made available, has been steadily carried on, and are now nearly completed, according to the plans I prepared in 1852 for the sewerage of the city, and which were adopted by your council. According as occasion presented, the old stone gullies have

been removed and new metal (trapped) ones substituted. The total number of those put down has been 2,526. There have been above 4,000 new house-drains put in."

He next enters into the long-debated question as to the best means of getting rid of the "Liffey Nuisance"—by the construction of intercepting sewers, in which he is supported by the opinion of Mr. Bazalgette:—

"I have now, briefly as possible, reviewed the state of this important question, and the steps taken up to the present by your Council, and the Special Committees you appointed to ascertain the best and most effectual, as well as the most economical plan for dealing with it. There can be no doubt *but the time has now come* when active measures will have to be taken to prevent the sewage of the city and suburbs being discharged into the Liffey or Dodder, rendering them, instead of being sources of health and ornament to the city, most offensive and dangerous nuisances, and filthy to look at, and this state of things will every year be getting worse, so long as the sewage is allowed to be discharged into them.

"For eighteen years I have had the honor of being your engineer, and under your authority have reconstructed the sewerage of the city, which was in a deplorable state when you got charge of it. During this period I have kept myself well acquainted, by reading and personal inspection, with what was going on in London and other large towns in Great Britain, as to their sewerage works, and have had the opportunity of consulting the ablest engineers on the subject, and I have no hesitation in stating that none of the suggestions made by irresponsible parties for erecting dams, sluice-gates, flushing reservoirs, side channels, &c., would be of any use; while some of them would be likely to lead to the

most disastrous effects on the bridges and quay walls; and in this opinion I am supported by Mr. Bazalgette and Mr. Stoney, engineer to the Ballast Board."

We are informed by Mr. Neville that from 1857 to 1861 there were $3\frac{1}{2}$ miles of streets paved with sets obtained from the Peumaen-mawr quarries in Wales, at a cost of £25,052! This stone "had been long used in Liverpool, Manchester, and other large towns in England." This preference for Welsh stone to be used on the streets of Dublin appears very strange to us, as we are aware of the fact that large quantities of paving sets of first-rate quality are being daily shipped from the Newry (Campbell's) and Carlingford (Savage's) quarries to London and many of the large towns in England. Mr. Neville condemns the granite sets thus:—

"*Paved Streets.*—In 1855 the Committee No. 1 authorized an experiment to be tried on a portion of Grafton-street by paving it with square sets got from Dalkey. The material was carefully selected, and tolerably well dressed, and was laid on a good foundation of concrete, and well grouted, but in a very short time the great traffic passing over this street told on the stone, and proved it quite unfit for the purpose. This material, selected from different quarries, has since been tried in Trinity-street, small portions of Aston's-quay, George's-street, and Ormond-quay, but with no better result, proving that this granite, although admirable for building purposes, sea and river walls, &c., is quite unfit for paving sets."

Referring to Mr. Edward Ramsbottom's contract for scavenging and watering the streets, and the resumption of those works by the Corporation, Mr. Neville says:—

"It is unnecessary for me to go into the matters which led the Committee (No. 1) to resume the carrying on of this branch of your works through their own officers and men; but I certainly would be slow to recommend them to contract for this work again, after past experience; and this opinion is not based upon any blame I mean to attach to the late contractor, who I know had great difficulties to contend with, and, I believe, acted in good faith, and with a wish to carry out the work with satisfaction; but the specification on which the contract was founded had to be prepared as to the number of times the streets should be scavenged in the week, not with the view to the perfect cleansing or watering of the streets, but to get as much work done as the means at the disposal of the Committee could afford to be allocated for the purpose. Under such a state of things, it must be easy to see the difficulties that were sure to arise when complaints of dirty or dusty streets arose; and until the Corporation can afford to allocate to the scavenging such a sum as would enable the No. 1 Committee to contract for the scavenging of all the streets every day, and to keep down dust irrespective of the number of times in the day the streets may require to be watered, I consider it will prove more satisfactory to keep the work in your own hands, although I am quite aware a contractor can get more work done by his men and horses, than any public or private body will through men and horses employed by themselves."

"I can state that the contract system has been tried in Liverpool, and other large towns in England and Scotland, but has generally been abandoned, from the very difficulties experienced here. In London the contract system is adopted, but there each parish does its own work, and many of those parishes are much larger than Dublin, and there are a great many of them. This has led to a number of highly respectable men making scavenging and watering work their specialty; and when a parish wants a contractor, there are plenty of competent competitors, ready with all the necessary experience and plant, to enter on a contract at the shortest notice,

after a fair competition. In Dublin, or indeed anywhere else but in such a large city as London, this state of things cannot exist—hence one of the great difficulties of getting this work satisfactorily done by contract."

"The Committee resumed the scavenging and watering of the streets through their own officers and men in the month of October last, and, after advertising for tenders, accepted one from Mr. John Butler, for a supply of horses at 6s. 6d. per diem for horse, driver, and harness, and with Messrs. Fitzsimon for the repair and maintenance of their carts and plant, for £850 per annum. This is a considerable advance in price on what was paid prior to 1859—horses, driver, and harness, then costing but 4s. 11d. per diem. In manual labour, also, there has been a large rise in wages paid to the men, so that the same quantity of work that cost in 1851 20s., will now cost, I estimate, above 25s., or fully 25 per cent. more; therefore, if it required £8,000 per annum to execute the scavenging and watering of the city twelve years ago, to do the same work now will cost £10,000 per annum."

In order to lessen the expense of carting the scavenge and for the purpose of getting rid of it soon as lifted:—

"It has been suggested by Mr. Sullivan, T.C., to employ barges or hoppers to be moored along the quays at certain points, and to discharge the scavenging soil of adjoining districts into them, and, as filled, to tow them out into the bay by a tug-boat to such a distance that no objection, in any point of view, could be raised to emptying their contents into the sea, as is done by the Ballast Board with the deposit of sand and sludge dredged out of the Liffey. This plan is adopted, I believe, in other places, and is one I have often thought of. It is decidedly practicable, and if the scavenge cannot be got rid of at a reasonable cost otherwise, will probably soon have to be resorted to."

Mr. Neville informs us that in the past year there were within the city 117 houses reported to be in a ruinous state and dangerous to passengers or to occupiers of adjoining buildings.

We shall conclude by giving Mr. Neville's suggestions as to "Hoards and Scaffolds" and "Building Clauses":—

"*Hoards and Scaffolds.*—I would suggest that on the first opportunity power should be obtained to enable the Corporation to make a charge on parties requiring licence to erect hoarding, scaffolds, gny-posts, or spur braces, such charge to vary with the length of time the obstruction was kept up. This would, I have no doubt, reduce the period these erections are retained up, occupying the foot-paths to the public inconvenience. It would be no hardship on the builder who would charge the sum against his employer, while it would make it the interest of both to keep them up as short a time as possible."

"*Building Clauses.*—I have, on several occasions, called attention to the great want that exists in Dublin of a Building Act and building surveyors as provided for in London, and all the large cities and towns in England and Scotland. In the bill proposed to be sought for last year, building clauses, copied from the Metropolitan Building Acts, and carefully revised by the Royal Institute of the Architects of Ireland (who memorialized the Corporation in their favour), were introduced, but, unfortunately, in the hurry of the moment, and from other causes, to which it is unnecessary for me to allude to here, there was much misunderstanding as to the nature of the office of building surveyor. Those officers may be either employed, and their entire time required by the Corporation at a fixed salary, and paying the fees they receive under the Building Act into the credit of the Corporation, or they may be gentlemen following their professional pursuits, and be paid for their services by the fees to be fixed in the Act, and received from the builders. By this it was not proposed to saddle the

* Report to the Right Hon. the Lord Mayor, Aldermen and Councillors of the City of Dublin, on the general state of the Public Works in the City, under their control. By Parke Neville, C.E., M.I.C.E., V.P.R.I.A.L. Dublin: Dollard, Dame-street.

citizens at large with the cost of newly-created officers, but simply that persons about to build new houses or alter old ones should do the work, subject to the direction and approval as to stability and sufficiency of strength in material to the satisfaction of the surveyor, and that they should pay his fee, which would not exceed from 10s. to 30s. on the average; and if the Corporation employed the surveyors on salary, a profit would probably arise to the improvement rate, while the parties building would receive in consideration of this small payment the protection and satisfaction of knowing that, as to the sufficiency in point of strength of the walls and bearing timbers of their proposed building, or in case of alterations, as to the sufficiency of the means to be taken to secure their houses from settlements and probable ruin, they would have the guarantee of the opinion and decision of an independent public officer. I believe all respectable builders would support such a measure, the only object of which is to protect parties building from ignorant or dishonest tradesmen.

"My attention has frequently been attracted to the necessity of this provision by the fact that in a large number of the houses reported to be in a dangerous state, the cause of their bad condition can be traced to the careless, injudicious, and pennywise manner in which the walls had been cut away for to get in new shop fronts, or in cutting away chimney-breasts and walls for the enlargement and improvement of shops.

"In a city containing about 24,000 houses, it must be evident the duties of building surveyors would be considerable, and it would require one officer, with adequate assistance, to give up his entire time to perform the duty, or, if private professional men were engaged, there should be at least one for each side of the city.

"I may mention that in a newly-built house I had to visit within the last few days, I found joists 3 inches deep by 1½ wide, used to support a floor of 12 feet span—of course it was like a spring board, and cannot last long. The builder will probably sell the house (which in all other parts was equally flimsy), and what a precious bargain the purchaser will get. This would not be allowable if there was a Building Act in force."

THE ASSISTANT COUNTY SURVEYORS OF IRELAND.

We are glad to find that a movement is on foot to obtain an increase in the salaries of the assistant county surveyors of Ireland. The effort should be seconded by all those who, like ourselves, are acquainted with the very arduous if not onerous duties these gentlemen have to perform at all seasons.

It has long been a matter of surprise to us that the Government and the Grand Juries have not seen the necessity of affording a sufficient remuneration to the assistants, while the county surveyors generally are in the receipt of very fair salaries—ranging, we believe, from £300 to £600 per annum.

We wish the association every success.

A meeting of the association was held in the Verdon Hotel, Dublin, a few days since, Mr. W. J. Robinson, County Tyrone, vice-president, in the chair. Delegates from most of the counties in Ireland were in attendance. Letters of apology were read from those unable to attend.

The minutes of last meeting, held in Omagh, were read and adopted. The treasurer's account showed the association to be financially in a flourishing condition. Reports of the county meetings held at last assizes (from which it appeared that all are alive to the benefits to be derived from co-operation) were read. The following resolutions were adopted:—

Proposed by Mr. W. S. Heney, C.E., Co.,

Down, and seconded by Mr. James Waters County Longford:

"That a memorial be prepared, setting forth our claims for increase of salary and superannuation, and presented by deputation to the Chief Secretary for Ireland."

Proposed by Mr. John Goulding, C.E., Monntpottinger, Belfast, and seconded by Mr. F. Bleakley, Clones:

"That each assistant be requested to send the general secretary a paper embodying his claims for increase of salary and superannuation, and that a committee be appointed to prepare a pamphlet from these statistics, and circulate same as they may deem it requisite; such papers to be with the secretary not later than the 24th September."

The following committee was chosen to carry out the above resolutions, viz., Mr. W. J. Robinson, V.P.; Mr. Wm. Browne, King's County; Mr. Wm. T. Heney, County Down; Mr. John Wray, County Fermanagh; with the secretaries and treasurer; with power to add to their number.

Proposed by Mr. Wm. McCulloch, Lifford, and seconded by Mr. F. Bleakley, Clones:

"That the evidence given and suggestions made by the county surveyors before the Select Committee of the House of Commons on the Irish Grand Jury Laws, in 1868, could not be taken as a fair criterion to judge of our claims for increase of salary and superannuation, inasmuch as they were chosen by the parties who directed the inquiry, and no facility was offered to those who had real grievances to complain of to send forward impartial witnesses."

Proposed by Mr. W. Browne, C.E., King's County, and seconded by Mr. J. T. Bailey, C.E., Queen's County:

"That the committee embody in their memorial that the salaries of assistant surveyors be affixed at a minimum of £80, and increased to £150 per annum as the grand jury shall think proper."

Proposed by Mr. John Wray, Enniskillen, and seconded by Mr. John Clegg, County Monaghan:

"That inasmuch as a report has gone abroad that this association intends having the office of county surveyor superseded by that of district surveyors, this meeting repudiates such a statement, and feels the necessity for the continuance of the office of county surveyor."

Mr. John Goulding, C.E., Monntpottinger, Belfast, was appointed as secretary in the room of Mr. C. Scott, C.E., resigned.

It was agreed that a meeting of the committee be held in the Athenæum, Belfast, on the 29th September.

GEOLOGY.

THE following is an abstract of the address delivered by Professor Harkness in opening Section C.—"Geology"—British Association for the Advancement of Science, at Exeter:—In no portion of Great Britain had they a better development of the series of rocks which forms the link between the well-established Devonian formation and the succeeding well-recognised carboniferous group than in Devonshire. The rock which formed the link he referred to was known to geologists as the Pilton beds, deriving their name from the locality in Devonshire where they are best developed. His object in referring to these rocks was to point out their relation to certain strata which are very well exhibited in the south-west of Ireland, and which occurred in a horizon corresponding with the Pilton shales. The Irish representatives of the Pilton shales were marked by a mineral aspect very nearly allied to their equivalents in this country, and they contain organic remains of a type very closely approaching those found in the Pilton rocks. Before alluding further to the Pilton beds, the professor referred to their Irish representatives and the rocks upon which these repose, and in doing so he availed himself of the labours of the late Mr. Jukes, for eighteen years director of the Irish Geological Survey, and to whose memory he paid

a passing tribute. The position of Ireland nearest Devonshire, where they had rocks which could be compared with those of this country, was the neighbourhood of the town of Wexford. Here were shales reposing upon Cambrian rocks which had been assigned to the old red sandstone by the officers of the Irish Survey, attaining a thickness of about 200 feet. In other places which the professor enumerated, the thickness varied from 600 to 700 feet, at Hook Point (County Wexford) to 10,000 feet in Glengariff and Killarney. Having described the arrangements of the rocks in the south of Ireland, which represent the Pilton beds, and also the deposits which support them, the professor next referred to North Devon, and observed that the fossil plants which occurred near the carboniferous slate, and in the Marwood sandstone, were specifically identical with such as were found in the carboniferous formation in the north of England. Here *filicites linariis* and *sagittaria paltheimii* occurred, and these were the forms which the base of the carboniferous strata afforded. The Pilton rocks succeeded the Marwood sandstone, and these Pilton rocks, in their mineral nature, were ultimately allied to the carboniferous slates. The strata which made up the Pilton group consisted of shale and slates, generally of a dark colour, with associated sandstone and gritty beds, and occasional thin bands of limestone, full of corals. The fossils of the Pilton rocks were very closely connected with those of the carboniferous slates. Some forms, however, which occurred in the Pilton rocks had not yet been recognised in their Irish representatives. There was an idea prevalent among many English geologists that the Cromholm grits were a series of rocks distinct from and lying beneath the carboniferous strata, and this idea had given rise to erroneous impressions concerning this series. This was not the conclusion of the officers of the Irish Geological Survey, and his own observations had led him to results similar to theirs. He hoped they should have at this meeting further evidence which would enable geologists to say whether these strata should be referred to the Devonian group or to the carboniferous formation. It appeared to him that the boundary between the Devonian and old red sandstone and the carboniferous formation was, in the British isles, placed in different horizons. In Ireland the carboniferous slates and interbedded Cromholm grits were referred to the latter, while in this country the equivalents of these were looked upon as appertaining to the Devonian formation. The learned professor then referred to the peculiar pebble beds in the neighbourhood of Bndleigh Salterton, which had been described by Messrs. Salter and Vicary. In Devonshire also they had a better development of miocene strata than was to be found elsewhere in the British isles. These were to be found at Bovey Tracey and its lignite beds, and these had been made the subject of a valuable communication to the Royal Society by Mr. Pengelly. The plant remains which had been obtained therefrom, and had been described by the eminent Swiss botanist, Dr. Oswald Heer, and, thanks to Miss Birdett Coutts, these Bovey Tracey lignites were now well known to geologists. The learned professor added that there was another matter connected with the geology of Devonshire which had special interest—the caves of Devonshire and their contents—but as they were now in a locality so near the source from whence so much of interest had come, he believed the section would again have before it important matters referring to Kent's Hole and other Devonshire caverns, and he hoped members would embrace the opportunity of visiting the localities. Geology and archaeology, he added, were now blending into each other, and, although the early history of man remained for a long time, like distant land, dim and ill-defined, of late, owing to the labours of Sir Charles Lyell, Sir John Lubbock, and others, we were now acquiring a clearer conception of our early ancestors, of their modes of life, and of the conditions under which they existed.

KENT'S CAVERN.

Mr. Pengelly, the secretary of the section, read the fifth report of the committee on the exploration of Kent's Cavern, with notes on the mammalian remains, and described the locality and the position of its different portions or apartments. In that part of the cavern known as the vestibule is a layer of black soil from two to six inches thick, known as the black-band. In that black-band were found 326 flint implements, chips, bone tools, &c., and bones of extinct animals, some of which were partially charred. The theory was that they formed a portion of the residence of an ancient British family. To test the disputed question whether it could be used as a cooking place without suffocating the animals, half-a-dozen faggots were lighted, and five persons who acted as the judges decided that the objection on that score was not tenable. All the bones which had been collected had been separately packed and labelled, showing their original position. Over 50,000 bones were collected, and all separately marked. When they came to be examined there was found among them a bone needle, with an eye capable of receiving small twine. It was broken, but was supposed to have been originally two and a-half inches in length. It had been exhumed on the 5th December, 1866, and belonged to the black-band beneath the stalagmitic floor. A bone harpoon, or fish spear, was also found beneath the black-band. The report next gave an account of the researches made during the present year. Mr. Pengelly mentioned that there was a perennial spring, which a mercantile company had proposed to utilize for the purposes of a brewery, using the cavern as their store for "the beverage" which they brewed. He described the narrow passage leading from certain portions of the cave to other portions. These were, in some cases, so small as to require explorers to progress in a recumbent position, and by a vermicular motion.—(A laugh.) In the cavern were found initials of individuals, and names and dates. One remarkable one was "Robert Hedges, of Ireland, February 20, 1688," and it was believed that the date was genuine. It was inscribed on the stalagmite, and proved that the drip of two and a-half centuries had not been enough to obliterate the inscription. Mr. Pengelly caused some amusement by exhibiting a collection of modern articles found in the lake, which had been emptied, consisting of such things as a gingerbeer bottle, a mutton bone, an oyster shell, a hammer, a chain, a candle, and candle sconce. An elephant's tooth was also found. They had also, this year, made a most important advance in their researches, by the discovery of evidence of the existence of man at a point in the remote portion of the cavern—the "lower cellarage," as Mr. Pengelly called it. On the 5th of March last a flint flake was found, which, there could be no doubt, had been produced by human agency. The flake has been laid before Mr. Evans, F.R.S., who had examined and reported upon it. He said it was undoubtedly of human workmanship, and carried on it evidence of its having been used as a tool, the edge being slightly worn away and jagged. The hill was tunnelled by burrows of foxes and other animals. A small bell had been found—such as was used to tie on a terrier when sent into a burrow. The depth of the lake was mentioned as an average of five feet.

KILTORCAN FOSSILS.

Mr. Bayley read a report of the committee on the fossils of Kiltorcan, county Kilkenny. He had obtained a small grant (£40) from the British Association, to make excavations in the Irish quarries, and the report gave the results, which were of considerable interest. Mr. Bayley produced a number of specimens of fern fossils excavated. They were beautifully perfect, some of them six feet long and having the appearance of dried ferns. He stated that when just uncovered they were of a beautiful green colour. Some new specimens were found and named. Some crustaceans were found, but very few now remain.

ETYMOLOGY OF "CRANNÓG."

At page 192 we printed from the Journal of the Historical and Archaeological Society of Ireland a letter from the Rev. W. Kilbride, and promised to return to the subject. We now give Mr. J. O'B. Crowe's opinions on the etymology of the word in dispute:—

"I think it a great pity that men who really can do something, nay, a great deal, in certain walks of learning, will yet persist in attempting other walks, a single correct bearing of which they have never taken the trouble to ascertain. Mr. Benn seems to me to be one of these. That philology is not his forte is no disparagement to him as a scholar, but that he should indulge in philology without the necessary preparation is, in my mind, a piece of great folly. Nothing could be so childish as his dead *crann* and live *cræb*. Even in ancient Irish *crann* is a living tree—Lat. *arbor*. *Ir machtra a focho peirrin cacha oen-chyann*: (Every single tree is mother of its proper offspring); gl. mater proprii foetus unaquæque arbor. (Zeuss, Gram. Celt. p. 999.) In the Irish word *crann*, as well as in its form in the sister dialects—Welsh, *pren*; Armorican, *prenn*—the idea of a growing tree is sometimes entirely lost in the general term *timber*. This is especially the case in Armorican, in which language *prenn* never means a living tree. Thus Villemaire, in his Breton dictionary: '*prenn* (s. m.) du bois in general et particulièrement celui qui est mis in oeuvre: c'est équivalent du Latin *lignum*.' The Breton word for *arbor* is *gwez*, *gwez*—Ir. *gob*; Welsh and Cornish, *guiden*. It is probable Mr. Benn has been looking into Villemaire, and looking over our native Cormac. As for *cræb*, it has no reference to life or death. Even an instrument used as a hand-bell in the courts of our ancient kings was called *cræb*, from its branching pendants.

"*Crannoc*, later *crannog*. The termination *-aca* in Gaulish becomes *-ach* in Irish; and *-auc*, or *-ac* in old Welsh; in modern Welsh *-awg*. This is a well-known rule. We find, however, certain Welsh words ending in *-awg*, which end in Irish, not in the normal *-ach*, but in *-oc*: thus the Irish *cuinnoc*, a churn, is in Welsh, *cunnaug*. But as the W. *cunnaug*, if equal to a Gaulish *cunnaca*, would in Irish be *cuinnach*; and as this form does not exist in Irish, we must presume that *cuinnoc* is an original *cunnaca*—the termination *-anc* being normal in Gaulish, and that the Welsh was borrowed from the Irish, or formed on a false analogy, since *n* before *c* is retained in Welsh, but rejected in Irish. The Irish *reboc*, a hawk, and the Welsh *hebaug* (id.) is another example. Now, *crannoc* I conceive to be one of this class of words, and to be equal to a Gaulish *crannaca*. So much for the form; as to the meaning, I think the following remarks will help us to it:—

"The Latinized *crannoc* occurs in two passages in Rymer's *Fœdera*, &c.: 'quinque villas cum duobus millibus *crannocis* bladi tribus molendinis combusserunt' (An. 1275): in another passage occur the words 'centum *crannocis* frumenti.' Here we find *crannoc* meaning a *measure*, that is to say, a *small vessel*. This is confirmed by a gloss in the *Senchus Mor*, lately published for the Master of the Rolls, p. 152: 'i. *crannoga* beca nabit anallor im an abiar (little rods [reede holders] they used to have formerly about the materials). There is a passage in the 'Sailing of the Curach of Mael Duin' (H. 2. 16, T. C. D.), where *crannan* is applied to the *curach*; *ar dñuic doiruc d'a ocu rozag d'a ar crannan re-moyn*:—It is straight God has led us, and God has taken our *little tree* (*crannan*) before us. The portion of the tale in which this passage occurs is wanting in Lebor na hUíde, and it is probable that the original term was *crannoc*, which the modern and bad scribe of H. 2. 16, altered into *crannan*, supposing the termination to be diminutive. My view, however, is in no way affected by regarding *crannoc* as diminutive.

"Now the transition from the meaning *small vessel* to *ship*, or to *large residence*, is in perfect analogy to the transition of the meaning of the word *tony*, which originally meant a *small vessel* for washing, &c., and which afterwards came to mean specially a *ship*, and generally any large house or *receptacle*. In the Book of Armagh, the Lat. *vas* (acc.) is glossed by the acc. *tony*: in the 'Brudin Daderga' a certain lady is described as washing in a beautiful *tony*: in ancient Tara we had two large houses each called a *tony*: while in the 'Vision of Adamnan,' Lebor na hUíde, the celestial city itself is called the *tony* of the nine orders of heaven. With regard to the origin of the word *tony*, I may say that it has nothing whatever to do with the Lat. '*longa navis*,' all our philologists notwithstanding, but of this I shall have occasion to speak in another place.*

* I may subjoin, however, that *tony* is only one of the large number of pretended loan-words from Latin. Up to the publication of my 'Daim Liac' (Dublin, 1867), the very venerable patriarchal word *muinntir*, *family*, used to designate the inhabitants of a chieftain's territory (Comp. *Cæsar's*

"I see that Mr. Atkinson, in referring to *rath*, supposes a connexion with the Teutonic *rath*, as in *reichsrath*, and that the word means a 'place of assembly.' On the former of these two points I shall say nothing just now, but I may say that the Irish *rath* is never used to mean a 'place of assembly.' A good deal has been written on the words *rath*, *ler*, and *dún*, their distinction and respective meaning, but the following passages will show that they have not yet been properly treated. They will also show that all three are required to constitute a royal residence, while the *rath*, one or more, and *ler*, which must be always combined, constitute a non-royal residence. *Hí ba dúnab zán nígú*: it shall not be a *dún* without kingship. (Leb. Ollam. Book of Ballymote.) Here we see that a residence not belonging to a sovereign is not a *dún*.

"About the sixth century, Mongan ruled the district around his palace of *Rath Mor Maige Lin* in the county of Antrim. The celebrated poet Forgoll and his company were staying with him:—*Diam boí dan Fonzoll níl la Mhonzan fecty anp, luo Mhonzan ar dún cræb d'íloo fecty anp. Fonc iuy écríne oc mánus a d'icræta*:—Now, as poet Forgoll was with Mongan on a time, Mongan goes upon *dún*, a period of day on a time. He finds the poetlet at learning of his lesson.' (Leb na hUíde). Here we have the *dún* the dwelling of poet Forgoll and his company.

"The whole place was surrounded with three concentric ridges or circles (*raths*). A certain personage is making his way towards the palace:—*bolnys fíur a cræb rín zar na ceóga racha combóí for lar lr: d'íruib combóí for lar níg-éarje*:—'he leaped with that shaft over the three *raths* until he was on floor of *les*; from that until he was on floor of *king-house*.' Here the *les* and the *king-house* were within the *raths*, circles or ridges, and so also was the *dún*. From this we see that the whole place consisted of three *raths* (enclosing circles or ridges)—a *les*, a *dún*, and a *king-house*, or *palace*. Now it is evident that, so far as the name is concerned, a royal residence might be called a *rath*, as it was here, or a *ler*, or a *dún*. No special inference, then, can be drawn from either of these names being applied to any residence save this: that if *dún* is the name, it must be a royal residence; if *rath* or *les*, it need not. I may observe that *rath*, which means a circle, a wheel, is properly applied to the enclosing ridge, and then transferred to the whole place, just as the English *court*, which means a circle, has been transferred in the same way. *Rath*=*rot*, Lat. *rota*. The form, *rot*, wheel, is the more usual; *rac* is also frequent: *carraic da rath*, a chariot of two wheels.' (Brocan's Hymn, Lib. Hymnorum). But of these three words, as well as *rín*, which was also applied to an ancient Irish residence, I shall speak elsewhere.

WIGHAM'S PATENT GASLIGHT.

It appears, from a paper recently presented to Parliament, that the course taken by the Board of Irish Lights, in applying Wigham's patent gaslight for the illumination of light-houses, has received the approbation of the scientific adviser of the Board of Trade, Dr. Tyndall, F.R.S. There are few of our citizens who are not familiar with the improvement made in the light shown from Howth Bailey lighthouse—one of the stations at which the new system has been adopted—since the new gaslight has been used there, and few but have admired its powers, especially in hazy weather, when the light has appeared to stream through the fog in luminous lines of lines of incandescence. It is much to the credit of the Board of Irish Lights that they should have been the original promoters of an invention which is likely to be so useful to mariners and the general maritime trade of the country. The burner of this light, devised and constructed by Mr. Wigham consists of a series of concentric rings, furnished with fishtail jets. The first three rings from the centre comprise a group of 28 jets; and that is the light which, in ordinary circumstances, is burned at Howth Bailey. But to the central group can be added in succession four other circles of burners, each comprising 20 jets. Thus the lowest light is emitted by 28

familia, "Gallie War," *passim*), and in Christian times applied also to a religious superior's society, was set down as a loan-word from the Lat. *monasterium*. Thus Dr. Whitley Stokes ("Goldilica," p. 31) says that *muinntir* is unquestionably, as Siegfried thought, a loan-word, like N. H. G. *munster*, from the Lat. *monasterium*. In the same writer's edition of O'Donovan's "Cormac," however, just published, he runs away (sub v. *muinntir*), from the monastery, never alludes to his having been there at all, or to who or what seduced him out of it, and gives exactly my interpretation. *Vid.* "Daim Liac," and Stokes's "Cormac."

jets, the next in power by 48, the third by 68 the fourth by 88, and the last by 108 jets of gas. It is possible, therefore, to employ lights of five different powers; and the superiority of the gas over the oil flame was very strikingly shown by graduated experiments. Dr. Tyndall describes the forms of the patent gas flame as truly splendid, causing the powerful flame against which it was tried to "shrink and pale" before its surpassing brilliance. He has also investigated the cost of the new gas system as compared with the largest of the oil lamps heretofore used in lighthouses, and reports that, taking interest upon outlay into account, and all materials and labour, there is an annual saving to the country in the use of the gas flame of £41 5s. for each lighthouse—no small consideration, more especially when the superiority of the light is taken into account. The report winds up by a recommendation that the new system should be still further developed in Ireland, a recommendation which we trust the Board of Irish Lights will not be slow to carry out; for in a matter of such importance, when human life as well as the safety of a vast amount of our floating property is at stake, no time should be lost. It appears that the light is actually thirteen times more powerful than the old mode of illumination, while the cost is positively less. We should say that, if possible, before the approaching winter, every lighthouse round our island should be supplied with this most important improvement.*

A NEW THEORY AS TO THE ORIGIN OF THE ROUND TOWERS OF IRELAND.

"WELL, I wonder who could have built them, and what for," was said recently by a tourist at Devenish, addressing no one in particular, but expressing the state of puzzlement to which the contemplation of the specimen before him had brought him. A countryman standing by took him up with—"Bedad, your honour, that's what nobody knows; but there's ould Jim Cassidy—as knowledgeable an ould chap as there is in the three counties—does he sayin that he thinks there must have been a Boord o' Works in thim days."

CORRESPONDENCE.

THE ROYAL INSTITUTE OF THE ARCHITECTS OF IRELAND.

TO THE EDITOR OF THE IRISH BUILDER.

SIR,—Can you inform me as to when it is probable the long-promised "Proceedings" of the Institute will be published for the use of its members? There have been several valuable papers read during the past four years, which it is desirable should be issued in the permanent form proposed by the Council.

A MEMBER.

[We cannot answer the question put to us by "A Member." The hon. sec. would, no doubt, supply him with all the information he desires on the subject.—ED. I. B.]

CLEANSING OF THE ROYAL CANAL.

TO THE EDITOR OF THE IRISH BUILDER.

SIR,—Allow me to call the early attention of the Sanitary Committee to the filthy state of the bed of the Royal Canal below Newcomen Bridge. The Midland Great Western Railway Company (whose property the canal now is) should be forthwith compelled to cleanse it. The construction, last year, of a main sewer (at a cost of £500) in continuation of a previously existing one from Mountjoy Prison, has relieved the canal from the sewage formerly discharged into it close to Messrs. Athol's Iron Foundry. The entire responsibility rests now on the enlightened directors of the railway company.

OLFATORY.

Newcomen-terrace, Aug. 31.

NOTICE.

ALTHOUGH we delayed issuing present number, in hope of having our illustration ready, we are even now obliged to publish without one. As it will appear in next number, we must beg the indulgence of our subscribers until the 15th inst.

RAILWAY NEWS.

WE find the following amongst the proceedings at the half-yearly meeting of the London and North Western Railway Company held on the 21st ult. :—

"In pursuance of the Dundalk and Greenore Railway Act, 1867, this meeting authorizes the directors to subscribe towards the undertaking of the Dundalk and Greenore Railway Company to an extent not exceeding £130,000, and for that purpose an additional ordinary capital of £130,000 is hereby created.

"That in pursuance of the Dublin and Drogheda Railway (North Wall Extension) Act, 1869, this meeting authorizes the directors to subscribe towards the said extension to an extent not exceeding £25,000, and for that purpose an additional ordinary capital of £25,000 is hereby created.

"That the agreement with the Irish North Western and Dundalk and Greenore Railway Companies for the supply by this Company of steamers be, and the same is, hereby approved, subject to such alterations as the Board of Trade may require and the directors agree to; and that this meeting authorizes the directors to exercise the borrowing powers of the Company to the extent authorized by the Company's Acts of Parliament."

The *Ulster Gazette* of Saturday last remarks thus:—Now that the Dundalk and Greenore line is in process of formation—to be finished in fifteen months—it is incumbent on Newry to complete the system by making the line through from Newry to Greenore. A comparatively small sum would do the work. The Dundalk and Greenore, including the docks at the latter place, is to be done for £106,000, and the line from Newry to the point of junction, could be made for £70,000 or £80,000. The formation of this line is of vital importance to Newry, and to the Newry and Armagh Railway, and we trust the people of both towns will take the matter up and carry it effectually through. The Ulster Railway, too, should contribute to promote this object. If the line be not made, the western traffic of this county will be tapped at Clones, and all carried by Dundalk to Greenore. We strongly impress this view on the directors of the Ulster Company. Instead of fighting and contending with the Newry and Armagh line, let them co-operate and promote the undertaking, and the whole of their railway westward of Armagh will feel the benefit. Another project is mooted, and likely to be carried out, as it is advanced by Mr. M'Corry and other able men, who have thrown themselves into the movement—we allude to the Newcastle and Greencastle project. This will serve the Greenore undertaking, but it cannot benefit the Ulster railway. Various projected lines are contemplated, all tending to one point, and a bright future is breaking on this long-neglected spot. The Carlingford Bar obstruction is being speedily removed, and the London and North Western Company have ordered a service of steamers for the line. So Newry and Armagh should bestir themselves, and not be left behind in the race of competition.

THE DUBLIN AND KINGSTOWN.

The management of the Dublin and Kingstown Railway has long been a subject of earnest remonstrance and of indignant protest in the columns of the Press, but so long as the expression of feeling was confined to such manifestations, bitter experience proved that the time spent in making them was thrown away. It was in vain that deputations of respectable gentlemen waited upon the board to solicit some concession as a favour which might have been demanded as a

right. The directors, as if impressed with the notion that they wielded arbitrary and irresponsible authority, were inflexible, and refused to yield to what the applicants believed to be most reasonable and necessary claims. They were deaf to the plea that property was depreciated, and the growth of the important townships on the line checked by their obstructive policy. The board reigned supreme, or, at least, seemed to think their dominion was absolute and indisputable. The "committee of property-holders and residents" were obliged to cast about for a remedy, and have adopted a proceeding which, if sustained by public opinion, will probably be found effectual. In another column we (*Express*) publish the rather formidable indictment which they have presented to the Board of Trade. While we record the fact that complaints have been unsuccessfully made, we offer no opinion as to how far they were well founded. We do not desire to prejudge the issues which are now raised. The charges are numerous and serious, and impartial inquiry is all that is demanded. On the part of the company, it may be alleged that they are each and all unsustainable. They may enter upon their defence, if they be called upon to do so, with the calm assurance which conscious innocence inspires, or even a keen sense of unappreciated merit. They may proceed to show, upon the conclusive testimony of official reports furnished by their own officers, that the general management of the line is such as to confer inestimable advantages upon the community; that it has given an impulse to local trade, and placed the travelling public under lasting obligations for the convenience, safety, and comfort which they enjoy. It may be shown, for instance, that merchandise is brought to the very doors of the traders, that the most liberal arrangements have been made for its regular and rapid transmission. It may be proved to the satisfaction of the Board that the scale of subscriptions is generously low, having regard to the luxurious (?) accommodation which is afforded. It may be established by the same evidence that the stations along the line are numerous and neat, provided with every requisite for health, and with an ample staff of obliging servants; and that the carriages are models of cleanliness and even elegance, the pride of every citizen and the envy of every stranger. All this and much more may be shown, although the public have not been able to see it, and the result may be a certificate of merit from the officer appointed to inquire. We trust, however, that the opportunity will be given by the Board of Trade to vindicate the character of the Company. The six hundred memorialists may be false accusers, the thousands of travellers may be false witnesses, and the directors may be public benefactors, whose line is a noble monument of enterprise and liberality. It is right that they should receive a full recognition of their acts, which can only be accorded after a full investigation. The public will await with interest the determination of the Board of Trade, to see if it really possesses, or is prepared to assert any power to control a railway company.

NOTES OF WORKS.

Extensive additions and improvements are being completed at Wakefield House, Grosvenor-road, Rathmines, for G. Farguharson, Esq., according to the drawings and under the direction of Mr. Joseph Maguire, 201, Great Brunswick-street. The builders are Messrs. Gahan and Son. Messrs. Edmundson and Co. supplied the kitchen ranges; Messrs. Ross and Murray the plumbing work; Messrs. Maguire and Son the grates and chimney-pieces; Mr. Thomas Cochrane did the painting.

The ceremony of dedicating the new R. C. Church at Ballyhooley, took place on the 22nd ult. We gave an illustration of it with our number of May 15th, 1867. It has been erected from designs by Messrs. Pugin and Ashlin, and is in the Gothic style. The material is limestone, with bands of red sandstone.

* For a lengthened description of Mr. Wigham's method of lighting, see *IRISH BUILDER* No. 180, June 15th, 1867.

WELSH ARCHEOLOGY.*

At the opening meeting of the Cambrian Archaeological Association's congress, held on the 9th, at Bridgend, in Glamorganshire,

Lord Dunsen, as president, made a very interesting address, in the course of which he pointed out that the neighbourhood contained an unusual variety of objects of archaeological interest, extending in date through a great range of time, and of varied character. They may be said to commence, he remarked, if we include the excursion to Gower, under Mr. H. Vivian's auspices, with the tumuli and barrows of prehistoric times. Then we have the British or Celtic fortifications, such as that still remaining at Dunsen and other places along the coast; next comes a class of monuments which, I regret to say, are but scantily appreciated here—namely, the ancient Christian inscribed stones and crosses. This expression will not be deemed too strong when I remind you that they are, for their number and for the length of their inscriptions, unequalled in any portion of the kingdom where crosses of a similar date exist. Certainly, as Dr. Petrie pointed out at Cardiff, there is no such collection within a few miles of each other in Ireland as is to be found in the group comprising Llantwit, Coychurch, Llangan, Merthyr Mawr, and Margam. At the last-mentioned place no less than eight are to be seen now erected within a few yards of each other; and yet little or nothing has been done towards identifying the persons they commemorate, with the different ecclesiastical establishments which must have once existed in this neighbourhood, and with which they were obviously connected. Passing to a later period, you will see some interesting churches containing characteristic local features, including among them the very peculiar church of Llantwit, and the remarkable semi-fortified abbey of Ewenny. Of abbeys of the first rank we have the ruins of Margam, with its beautiful chapter-house, and within our reach is the finest of Welsh cathedrals, so lately restored by the zeal and munificence of the inhabitants of this county. Of castles you will see a variety, ranging in date from the simple Norman keep of Ogmere to the latest portions of St. Donats. This most interesting castle, now happily saved from becoming a mere ruin, so beautifully situated on the shore of the Bristol Channel, with its ancient church and elegant cross, would alone repay the archaeologist many miles of travel to see. In addition, you will visit one of the grandest mediæval fortresses in the kingdom, Caerphilly, exhibiting, even in its decay, the most instructive example of military skill and of feudal power. In our excursions will also be included several examples of the domestic architecture of our ancestors, dating from the fifteenth to the seventeenth century. From this enumeration you will see the justice of a previous remark, that few places in the principality afford so great a variety of objects to be visited, extending over so vast a range of time in the dates of their erection, and including among them several of peculiar interest and of considerable importance. Having touched upon what has been effected in the archaeology of Wales since the commencement of our association in 1846, may I be permitted to point out very briefly how much still remains to be done? First, for this country, a complete description, with accurate views and measurements of our cromlechs, and an examination of the ground within them, is still a desideratum. Our Roman roads and stations have not been thoroughly explored and mapped down; we have no accurate descriptions with measurements of the various earthworks which exist, particularly along the coast. When properly examined they will probably be found to be divisible into more than one class, and to belong to more than one age. It appears that the Rev. H. H. Knight read a paper at the Monmouth meeting, in which he advocated the idea that the coast forts or earthworks were erected by the Danes. This paper,

unfortunately, was never published, and I am unacquainted with the arguments by which his theory is supported. One of the most interesting features in the archaeology of this country is the number of the inscribed Christian stones to which I have already alluded. This class of monument has been entirely neglected by our local antiquaries. May we venture to hope that the owner of the most remarkable group—that which stands upon the ruined walls of his noble chapter-house of Margam, a building which appears almost modern by the side of those venerable monuments of a ruder age, and a more primitive state of art—would give to the world accurate drawings or photographs and measurements of them; and, what would be better still, would include all the similar Christian inscribed stones of the neighbourhood, forming as they do the most important collection of the monuments of the pre-Norman Church to be found in England and Wales. Researches should be diligently made among the ancient Welsh ecclesiastical records, such as the book of Llandaff and others, in order to try and identify the names which appear upon their inscriptions, so as to obtain a better clue than we at present possess of the date of their erection. By these means the foundations would be laid for obtaining some definite knowledge on the rise and progress of industrial art in this country before the Norman Conquest. This very interesting branch of archaeology is being admirably worked out for Ireland by one of the highest authorities on the subject of ancient Irish art, and I trust that the result of the accomplished author's labours, in tracing the progress of Irish monumental ecclesiastical art may, by her kind consent, be laid before you, for the purpose of comparison, during the present meeting. Not one half of our mediæval castles have as yet been described, and scarcely anything has been done towards illustrating the manors, houses, and other examples of domestic architecture, so many of which are to be found in this country. To any one conversant with the early ecclesiastical architecture of Ireland, it appears curious that so few remains of the Welsh Church, prior to the eleventh century, have been as yet noticed; while, on the other side of the Channel, hundreds of churches remain, some tolerably perfect, many of them erected centuries before that date. It is not probable that any portion of these primitive churches exists in this country; but on the islands along the coast of Pembrokeshire, or in the most out-of-the-way portions of some of the western counties, small, early cell oratories, analogous to those on the western coast of Ireland, may be discovered. It must be very interesting to see whether any difference in the place or size of the building, or their mode of construction, is observable; whether there may be the same sort of difference in the primitive churches as exists in those crosses and monumental stones between those of Ireland, Scotland, Wales, Cornwall, and the Isle of Man. Lord Dunsen rightly urged the importance of forming a museum for Wales, that the national antiquities might find a suitable depository. There was a fine one in Dublin, another in Edinburgh, and the British Museum had made a good start in the same direction. He really thought Wales should start and get up one that would be worthy of the country.

A VISIT TO FINGAL'S CAVE,
STAFFA.

Approaching Staffa, one is apt to be disappointed. It seems but a barren island, one mile and a-half in circumference, rising at its highest part 170 feet from the water, somewhat flat on the top, while in its sides great caves seem to have been scooped out by the action of the sea. Standing out alone in the wide Atlantic, one's first impressions are those of its absolute solitariness. No tree cheers the eye, nor is there sign of human habitation. It is, indeed, the abode of no human being; and, save when tourists land, or a shepherd crosses from Mull or Ulva, it

hears no sounds but the surging of the mighty sea, the bleat of a few sheep, and the melancholy wail of the gulls and other sea birds which in great numbers build their nests among its rocks.

Staffa is remarkable for the prismatic or columnar form in which its cliffs are found. These are basaltic, and resemble those of the Giant's Causeway, of which, indeed, Staffa seems so much to be the counterpart, that some scientific men have considered it probable that the same formation extends from the one to the other.

The steamer was brought to, off the southern end. Two boats belonging to "Ulva's Isle" came off from Staffa, to which they had come that morning, and the steamer's own boats were lowered. By these the passengers were conveyed ashore, and landed at the entrance to Fingal's Cave, which is by far the finest of the six caves on the island. Many of the columns, we thought, were much larger than those of the Giant's Causeway: the side of one, a hexagon, measures two feet. The forms of the stones are hexagons, pentagons, and four-sided. As we ascended the broken pillars and entered this "Hall of Columns," we were awe-struck with its solemn grandeur. We mentally photographed this sublime scene, and have preserved the original as one of the most sacred treasures of our memory, but a copy thereof we can never hope to produce. Here was a great cavern, 227 feet in length by 42 in breadth, with an arch 66 feet high from the water, composed throughout of perpendicular columns irregularly broken. These columns are crusted over with a calcareous substance, which gives them very beautiful and varied hues. Into this solemn temple, made without hands, the sea flows to the extreme end, now as when we saw it, softly heaving in green undulations, as if subdued by the sublimity of the scene it was keeping silence in the House of God. But again, as in the wild nights of the winter, when the winds are out, dashing in its mighty Atlantic billows, filling every pipe in this colossal organ, and making the cave reverberate with the deep bass of its praise to Him whose it is, "for He made it." All our fellow-passengers came into the cave, which can be entered by all except the very timid, as a rope secured to the wall by iron fastenings runs inwards. From the end of the cave the view seawards is very fine, and, set as in a frame, Iona with its ruins is distinctly seen. Iona and Staffa! How interesting are they both, yet how dissimilar! The one owes its celebrity to the hallowed memory of the men who laboured on it, and the crumbling memorials left of a bygone age. This was the building of the Heavenly Architect, in the fashioning of which no sound of hammer was heard. On Iona we are carried back some 1300, or say 1800 years. Here, who shall say how far? If sermons are to be found in stones, would that one in Fingal's Cave have preached to us its history!

While our fellow-passengers with ourselves stood in line in Fingal's Cave, a sense of the Creator's power and majesty seemed to fill every breast; for when a gentleman from across the Atlantic began to sing the Hundredth Psalm, without any intimation all simultaneously joined, and the effect of that singing in that place was alluded to by some of our fellow-travellers, days afterwards, as beyond anything they had ever experienced.

We left the cave and walked round part of the island, and by the aid of a ladder climbed to the top. The prismatic formation extends all over, although, as at the Giant's Causeway, in some parts it is much more perfect than at others. Into none of the other caves had we time to enter, so we returned to the steamer, hoping we might at some future time have more leisure than the hour allowed us to investigate the wonders of Staffa, and, almost alone, be better able to appreciate its solitude.

We were soon off again on our course.

"The shores of Mull on our eastward lay,
And Ulva dark and Colonsay,
And all the group of islets gay,
That guard famed Staffa round."

—D. GRANT, in *Coleraine Chronicle*.

* From the *Builder*.

THE BRITISH ASSOCIATION AT EXETER.

THIS body had its annual meeting this year at Exeter. The President, Professor Stokes, delivered his inaugural address on the evening of the 18th ult. He reviewed at great length the present state of scientific knowledge, noticing the great reflector constructed by Mr. Grubb of this city, and recently erected at Melbourne. "It is a reflector of four feet aperture, of the Cassegrain construction, equatorially mounted, and provided with a clock movement. Before its shipment it was inspected in Dublin by the committee appointed by the Royal Society to consider the best mode of carrying out the object for which the vote was made by the Melbourne legislature; and the committee speak in the highest terms of its contrivance and execution."

In Section G.—"Mechanical Science"—the President, Mr. C. W. Siemens, delivered the inaugural address. He commenced by referring to the important question of technical education. He said the great International Exhibition had proved that, although England still holds her ground as the leading manufacturing country, the nations of the Continent have made great strides to dispute her pre-eminence in several branches, a result which is generally ascribed to their superior system of technical education. He thought all would agree in the necessity of steps being taken to promote the work of universal education, although he, for one, thought that objection may be made against the plan of merely imitating the example of our neighbours. The polytechnic schools of the Continent, not satisfied to impart to the technical students a good knowledge of mathematics and of natural sciences, pretend also to superadd the practical information necessary to constitute them engineers or manufacturers. This practical information is conveyed to them by professors lacking themselves practical experience, and tends to engender in the students a dogmatical conceit which is likely to stand in the way of originality in the adaptation of new means to new ends in their future career. On this account the president should prefer to see a sound "fundamental" education, comprising mathematics, dynamics, chemistry, geology, and physical science, with a sketch only of the technical arts, followed up by professional training such as can only be obtained in the workshop, the office, or the field. The interest evinced throughout the country in the work of education, by parliamentary inquiries, by the erection of colleges and professorships, and by the munificence of a leading member of this section in endowing a hundred scholarships, are proofs that England intends to hold her place in this question of education amongst the civilized nations, and he was confident that she will accomplish this object in a manner in unison with her practical tendencies and independence of character. He next adverted to the Patent Laws, pointing out their important bearing on the progress of arts and manufactures, and combating the views of those who advocated their entire abolition. The greatest illustration of the beneficial working of the patent laws was supplied, in his opinion, by James Watt, when, just 100 years ago, he patented his invention of a hot working cylinder and separate steam-engine condenser. After years of contest, James Watt was only upheld in his struggle by the deep conviction of the ultimate triumph of his cause. This conviction gave him confidence to enlist the co-operation of a second capitalist, after the first had failed him, and of asking for an extension of his declining patent. Without this help Watt could not have succeeded in maturing his invention; he would have relapsed into the mere instrument-maker, with broken health and broken heart, and the introduction of the steam-engine would not only have been retarded for a generation or two, but its progress would have been based probably upon the coarser conceptions of Papin, Savery, and Newcomen. Admitting the evil of the present system of the patent

laws, he considered they needed for the most part no special legislation, but it could be traced to the imperfect manner in which the existing patent laws are carried into effect. During the next session of Parliament the whole question of the patent laws was likely to be inquired into by a special committee. He then proceeded to notice the latest achievements of engineering science, the Great Pacific Railway, which joins California with the Atlantic States of the American Republic, and the Suez Shipping Canal, which will be opened very shortly to the commerce of the world. Telegraphic communication with America has been rendered more secure against interruption by the submersion of the French Transatlantic Cable. Telegraphic communication with India still remains in a very unsatisfactory condition, owing to imperfect lines and divided administration. To supply a remedy for this public evil, the Indo-European Telegraph Company will shortly open its special lines for Indian correspondence. In Northern Russia the construction of a land line is far advanced to connect St. Petersburg with the mouth of the Amour river, on contemplation of which only a submarine link between the Amour and San Francisco will be wanting to complete the telegraphic girdle round the earth. But, while great works have to be carried out in distant parts, still more remains to be accomplished near home. It is one of the questions of the day to decide by which plan the British Channel is to be crossed, to relieve the unfortunate traveller to the Continent of the discomfort and delay inseparable from the existing arrangements. Considering that this question has been taken up by some of our leading engineers, and is also entertained by the two interested governments, we may look forward to its speedy and satisfactory solution. So long as the attention of railway engineers was confined to the construction of main lines, it was necessary for them to provide for a heavy traffic and high speeds, and these desiderata are best met by a level permanent way, by easy curves and heavy rails of the strongest possible materials—namely, cast steel; but in extending the system to the corners of the earth, cheapness of construction and maintenance for a moderate speed and a moderate amount of traffic become a matter of necessity. Instead of plunging through hill and mountain, and of crossing and recrossing rivers by a series of monumental works, the modern railway passes in zig-zag up the steep incline, and conforms to the windings of the narrow gorge; it can only be worked by light rolling stock of flexible construction, furnished with increased power of adhesion and great brake power. Yet, by the aid of the electric telegraph in regulating the progress of each train, the number of trains may be so increased as to produce, nevertheless, a large aggregate of traffic; and it is held by some that our trunk lines even would be worked more advantageously by rolling stock. The brake-power on several of the French and Spanish railways has been greatly increased by an ingenious arrangement, conceived by Monsieur Lechatelier, of applying what has been termed "contre vapeur" to the engine, converting it, for the time being, into a pump forcing steam and water into the boiler. The president then adverted to the Armstrong gun, the Whitworth bolt, and the defensive armour to resist them, in turn defeated by the hardened shot of Palliser or Grison. The ram of war, with heavy iron sides, which a few years since was thought the most formidable, as it certainly was the most costly weapon ever devised, is already being superseded by vessels of the "Captain" type, as designed by Captain Coles, and carried out by Messrs. Laird Bros., with turrets (armed with guns of gigantic power) that resist the heaviest firing, both on account of their thickness and of the angular direction in which the shot is likely to strike. By an ingenious device Captain Moncrieff lowers his gun upon its rocking carriage after firing, and thereby does away with embrasures (the weak places in protective works), while at the same time

he gains the advantage of reloading his gun in comparative safety. While science and mechanical skill combine to produce these wondrous results, the germs of further and still greater achievements are matured in our mechanical workshops, in our forges, and in our metallurgical smelting works. Here a great revolution of our constructive art has been prepared by the production, in large quantities and at moderate cost, of a material of more than twice the strength of iron, which, instead of being fibrous, has its full strength in every direction, and which can be modulated to every degree of ductility, approaching the hardness of the diamond on the one hand, and the proverbial toughness of leather on the other. To call this material cast steel seems to attribute to it brittleness and uncertainty of temper, which, however, are not its necessary characteristics. This new material, as prepared for constructive purposes, may indeed be both hard and tough, as is illustrated by the hard steel rope that has so materially contributed to the practical success of steam ploughing. Machinery-steel has gradually come into use since about 1850, when Krupp (of Essen) commenced to supply large ingots that were shaped into railway tyres, axles, cannon, &c., by melting steel in halls containing hundreds of melting crucibles. The Bessemer process, in dispensing with the process of puddling, and in utilizing the carbon contained in the pig iron to effect the fusion of the final metal, has given a vast extension to the application of cast steel for railway bars, tyres, boiler plates, &c. This process is limited, however, in its application to superior brands of pig iron containing much carbon and no sulphur or phosphorus, which latter impurities are so destructive to the qualities of steel. The puddling process has still to be resorted to, unless the process of decarburization by Mr. Heaton takes its place to purify those inferior pig irons which constitute the bulk of our production; and the puddled iron cannot be brought to the condition of cast steel except through the process of fusion. This fusion is accomplished successfully in masses of from three to five tons, on the open bed of a regenerative gas furnace, at the Landore Siemens steel works, and at other places. At the same works cast steel is also produced, to a limited extent as yet, from iron ore, which, being operated upon in large masses, is reduced to the metallic state and liquified by the aid of a certain proportion of pig metal. The regenerative gas furnace, the application of which to glass houses, to forges, &c., has made considerable progress, is well suited for these operations, because it combines an intensity of heat, limited only by the point of fusion of the most refractory material, with extreme mildness of draught and chemical neutrality of flame. These and other processes of recent origin tend towards the production, at a comparatively cheap rate, of a high class material that must supersede iron for almost all structural purposes. As yet engineers hesitate, and very properly so, to construct their bridges, their vessels, and their rolling stock of the material produced by these processes, because no exhaustive experiments have been published as yet, fixing the limit to which they may safely be loaded in extension, in compression, and in torsion, and because, as yet, no sufficient information has been obtained regarding the tests by which their quality can best be ascertained. This want is in the way of being supplied by the experimental researches that have been carried on for some time at the dockyards at Woolwich: the results of Mr. Whitworth's experiments tending to render the hammer and the rolls obsolete by forcing cast steel, while in a semi-fluid state, into strong iron moulds by hydraulic pressure, are looked upon with great interest. But, assuming that the new building material has been reduced to the utmost degree of uniformity and cheapness, and that its limits of strength are ascertained, there remains still the task for the civil and mechanical engineer to prepare designs suitable for the development of its peculiar qualities. In constructing works in

foreign parts the reduced cost of carriage furnishes also a powerful argument in favour of the stronger material, although its first cost per ton might largely exceed that of iron. The inquiries of the Royal Coal Commission into the extent and management of our coal fields appear to be re-assuring as regards the danger of their becoming soon exhausted. Nevertheless, the importance of economizing these precious deposits in the production of steam power, in metallurgical operations, and in domestic use, can hardly be over-estimated. The calorific power residing in a pound of coal, of a given analysis, can now be accurately expressed in units of heat, which, again, are represented by equivalent units of force or of chemical action; therefore, if we ascertain the consumption of coal of a steam-engine or of a furnace employed in metallurgical operations, we are able to tell, by the light of physical science, what proportion of the heat of combustion is utilized and what proportion is lost. Having arrived at this point, we can also trace the channels through which loss takes place, and in diminishing these, by judicious improvement we shall more and more approach those standards of ultimate perfection which we can never reach, but which we should nevertheless keep steadfastly before our eyes. Thus, a pound of ordinary coal is capable of producing 12,000 (Fahrenheit) units of heat, which equal 2,240,000 foot lb. or units of force, whereas the very best performances of our pumping engines do not exceed the limit of 1,000,000 foot lb. of force per pound of coal consumed. In like manner 1 lb. of coal should be capable of heating 33 lb. of iron to the welding point (of say 3,000° Fahr.), whereas, in an ordinary furnace, not 2 lb. of iron are so heated with 1 lb. of coal. These figures show the field for further improvement that lies yet before us. Although heat may be said to be the moving principle by which all things in nature are accomplished, an excess of it is not only hurtful to some of our processes, such as brewing, and destructive to our nutriment, but to those living in hot climates or sitting in crowded rooms, an excess of temperature is as great a source of discomfort as excessive cold can be. Why, then, should we not resort to refrigeration in summer as well as to calorification in winter, if it can be shown that the one can be done at nearly the same cost as the other? So long as we rely for refrigeration upon our ice-cellars, or upon importation of ice from distant parts, we shall have to look upon refrigeration as a costly luxury only; but the president expresses his belief that by the use of properly constructed machines it will be possible to produce refrigeration at an extremely moderate expenditure of fuel and labour. A machine has already been constructed capable of producing 9 lb. of ice (or its equivalent) for 1 lb. of coal, whereas the equivalent values of positive heat developed in the combustion of 1 lb. of coal, and of negative heat residing in 1 lb. of ice, is about as 12,000 to 170, or as 70 to 1. This result justifies the employment of refrigerating machines upon a large scale; but it is hard to say what results may yet be reached with an improved machine on strictly dynamical principles, because such a machine seems not tied in its results to any definite theoretical limits. In changing, for example, a pound of water from the liquid into the gaseous state, a given number of units of heat are required that may be produced by combustion of coal or by the expenditure of force; but in changing the same pound of water into ice, heat is not lost but gained in the operation, which heat must be traceable to another part of the machine, either as sensible heat or as developed force.

NEW ORANGE HALL, OMAGH.

THE first stone of a new Orange Hall was laid on the 19th ult. The designs are by Messrs. Louch and Wilmot, architects, Dublin and Derry. The building will consist of great and minor halls, reading and coffee-rooms, caretakers' rooms, pantry, cloak-rooms, closets, &c. All the apartments will be roomy and well ventilated. The "great hall" will

be 70 feet by 38, and its height will be 30 feet. It will have a spacious gallery at one end. An open roof, with arched principals springing from carved corbels, will contribute to the architectural beauty of the "great hall," and make it all the more suitable for the comfort and accommodation of large audiences. The timber of the roof will be stained and varnished. During the day three-light Gothic-headed windows, filled in with memorial stained glass, will receive the light, and gas will be used at night. The reading and coffee-room is to be 28 feet 6 inches by 24 feet, and the "minor hall," which will be finished in a similar manner to the "great hall," is to be 42 feet by 24 feet. Chiselled sandstone will be employed in the front of the building facing Bridge-street; coloured brick will constitute the outer Gothic arches over the windows, and polished granite, with carved capitals, will be employed in the shafts of the window columns. The sandstone is to be procured at the Drumquin quarries. There will be a balcony to the middle windows of the "minor hall;" the parapets will be pierced with trefoils, and the centre gable ornamented with a panel, which will contain a sculptured equestrian figure of King William III., together with busts of the Earl of Enniskillen, Captain Mervyn Stewart, and William Johnston, Esq., M.P. Mr. Samuel McClean, of Omagh, is the contractor.

NEW R. C. CHURCH, CROSSHAVEN, COUNTY CORK.

THE foundation stone of a new church was laid on the 22nd ult. at Crosshaven, Co. Cork, by the Bishop, the Most Rev. William Delany, D.D.

The new church, which is being built from designs by Mr. E. Welby Pugin, will stand due east and west, occupying a commanding site on the brow of the hill, directly facing the entrance to the Carrigaline river. In plan the building will consist of a nave and aisles, terminated at the east end by the chancel and side chapels. Over the side arches of the nave, which will be supported by columns of polished Cork red marble, will run a clerestory of simple but effective design. The sacristy will be on the south side of the church, near to the chancel, and at the south-west angle of the building a baptistry will be provided. The roofs will be of exposed timber work, having the ceiling spaces pannelled. The church, as laid out, is 92 feet long, by 45 feet wide in the clear, and the height, from floor to ridge pole, will be 55 feet. Externally the building will be finished with limestone facing and Bath stone dressing to the doors and windows. An outside porch is provided at the western or principal entrance, and a lofty tower or spire (the lower storey of which serves as a second entrance porch) stands about mid-way in the length of the north elevation. In the centre of the lower part of the east or chancel gable, just above where the foundation has been laid, will be a niche containing a statue of Saint Brigid, the patron saint of the parish, and to whom the new church is to be dedicated. Above this niche, in the upper portion of the same gable, and filling up the space over the high altar, when viewed from the interior, there will be a large and very handsome rose window. Other rose windows of smaller size and varied in design, will also be introduced in the gable of the aisles. The style of the architecture is Victorian Gothic, and the work is being carried out under the personal superintendence of Mr. Collingridge Barnett, the Irish representative of Mr. Welby Pugin. Mr. Rd. Evans, of Cork, is the contractor.

THE TAILORS AND THEIR WORKSHOPS.

RESPECTING the evasion of the provisions of the Public Health Act in this city, a "Journeyman Tailor" has stated his views in the columns of a morning journal lately. Our space will not permit us to print them in

extenso; we give the chief points presented by him for consideration. He says:—

"One would imagine that there would not be found any person attempting to contravene the benevolent effort of the legislature in the matter of this act, but it is an undeniable fact that there are those who consider that their privileges as employers of labour are circumscribed by the operation of the act, and therefore use every means of evasion at their disposal for the purpose of retarding, if not defeating, the operation of the law—a law, by the way, which only asks us to be humane. It is melancholy to observe the power of evasion here, for, notwithstanding the vigilance and activity of the inspecting officers, the warnings of medical men on the danger of overcrowding, tending as it does to contagious contact in male and female wearing apparel, whether made in the house of the working tailor or the crush-pens of the millinery houses; and notwithstanding the efforts made in the press to force the attention of the public to this important matter, we find that through the system of evasion now in practice the efforts of the legislature are indirectly set at naught. I will here remark that my observation is necessarily directed to that part of the act which relates to my trade, for here, in my humble opinion, lies one of the most extended opportunities for evasion in the whole act, for the difficulties of detection are multiplied at every step. I shall endeavour to show some of the difficulties which beset those who have charge of the act in establishing a case, and commence with the workshops, so called, which in too many instances are only a blind meant to convey the idea that all the work is done on the premises, which, except in a few instances, is a shallow deception. This will be better understood when I explain that the greatest number working on the premises of the employer, at the highest pressure of business, does not exceed 400, and that the lowest computation would show that there were at least 1,200 tailors in this city. Now it is not unnatural to make the inquiry—where are the remaining 800, and under what circumstances they carry on the business of their trade? My object is to show the gross deception that is being practised by those whose duty it is to guard the public from danger that may be avoided by the opening of real workshops properly ventilated, and capable of containing all the workmen, thereby offering a guarantee that the double duty of sanitary safety to the customers and the workmen is recognised, instead of which, as is the general practice, about one-third of the workmen are on the premises, while the remainder are compelled to take the work to their own homes, the limits of which may be already too small for domestic purposes, added to which they must provide their own firing and light, and every other requisite to carry on their trade, and all this without any corresponding advantage in their wages; indeed the contrary is too often the rule. But there is a still worse feature of evasion which I desire to state, and about which I challenge contradiction. It is that there are persons in receipt of highly respectable and extensive business who have no workshops at all, if we except the homes of their workmen. Having regard to the statement of Dr. Cameron and other eminent authorities, that for healthful purposes each person should enjoy 300 cubic feet of pure air, and knowing, in a general way, the overcrowding of the dwellings of the working classes, I question how many instances could be adduced in which such condition was fulfilled either in the "shop" or out of it? In view of meeting the difficulty of establishing a case there is a way suggests itself to me, that is, that employers should be requested to furnish the Board of Health with the number of hands employed on the premises, and the number not employed therein, with their names and addresses. This would, in my humble opinion, go far to bring to light the sanitary condition of the tailoring trade. It is due to more than one interest to effect this. It is due to the nobility, gentry, members of the learned professions, &c., to satisfy them under what circumstances their wearing apparel is made up, and who, on the other hand, might assist the good work by inquiring, when leaving an order at the "tailor's," whether the provisions of the Public Health Act were complied with. If it effected no other good result, it would give parties concerned to understand that the question had struck deep root in the public mind, and stood for solution; it would also convey that compulsion was only a matter of time. It might be useful if all "wearers" were to ask the question—where are the garments made which are worn in the crowded theatres, in the ballrooms, in the lecture-hall, in the law courts, in all places of numerous assembly, even to the throne room at the Viceregal receptions?"

We trust that the above sensible and well-timed remarks will be duly considered by all parties concerned, and the wise provisions of the Public Health Act in future be carried out strictly.

STAINED GLASS AT ST. AUGUSTINE'S, BIRMINGHAM.

FIVE windows (the *Builder* informs us) have just been completed by Messrs. Hardman and Powell for this church, at the cost of a few members of the congregation. Hitherto St. Augustine's had only one stained window, erected by the firm already named, in the centre of the apse. By the addition just made the number of pictorial windows is raised to six, and the chancel lighting completed. The series which may be described as illustrating the history of our Lord, commences on the north side of the edifice, with the incident of the Agony in the Garden. In the dexter or right-hand light our Lord is represented kneeling in prayer, whilst below sleeps St. Peter, his hand on his sword, as if engaged, even in dreams, in defending his Divine Master. In the companion light appears the figure of the Ministering Angel, presenting the figurative cup alluded to in the prayer of our Lord. St. John and St. James are seen peacefully sleeping below. In the second window is pictured the Procession of the Cross. In the adjoining light the three Marys and St. John are seen mournfully following the procession, whilst a number of Jews issue from the city gate in the background. The third window, illustrating the subject of the Crucifixion, is the one previously erected in the centre of the apse. The fourth window represents the sepulchre which our Lord's body was entombed. Window number five depicts the Resurrection. In the dexter light our Lord is shown, rising in glory from the tomb, bearing aloft the cross and banner of victory. In the adjoining division, beneath and beside the tomb in the companion light, the guards recoil in terror and amazement from the prodigy, whilst two angelic witnesses descend from above. The Ascension is the subject of the sixth and last window. In the tracery, over the third and fifth windows of the series, are inserted the symbols of the Lamb and the Pelican, typical of our Lord and His Passion. The glass employed is from the works chiefly of Messrs. Chance Brothers and Co. The designs for the whole were by Mr. John Powell, of the firm of Hardman and Powell. In addition to the works described, Messrs. Hardman are engaged upon the manufacture of a brass altar railing, which is being presented to the church by Mr. Joseph Gillott. It is understood that the congregation have provided for the completion of the chancel in all its details.

THE LATE J. BEETE JUKES.

A CORRESPONDENT of the *Athenæum* supplies some brief notices of this gentleman, whose demise was recorded a month since:—

"Joseph Beete Jukes was an Englishman. For the last nineteen years he had been on the Irish Surveys. Professor Jukes graduated at St. John's College, Cambridge, in 1836. He studied geology under Sedgwick, of whom he was a favourite pupil. After he left college he sailed to and explored the north coast of Australia on board H.M.S. Fly, to which he was appointed as naturalist. Subsequently he surveyed the island of Newfoundland. After his return from that country he joined the English survey under Sir H. De La Beche, when Mr. Jukes examined some of the most intricate parts of the geology of North Wales. Later he minutely worked out the South Staffordshire coal field, and wrote a description of it, which was published among the *Memoirs of the Geological Survey*. In 1850 Professor Jukes was appointed to the directorship of the Irish branch of the survey, and in 1853 was elected a fellow of the Royal Society. The book by which his name is best known is his 'Student's Manual of Geology.' His style as a writer is vigorous, clear, and simple, an exact portrait of the man himself, who by nature was open, straightforward, and upright. As a field geologist few could surpass him; in a moment grasping the key to a country, and being able to explain what others had puzzled

over for months. None could generalize as he could; at the same time he did not despise details. He worked out each spot of country with minuteness. Under his acute supervision the igneous rocks of Ireland have been divided up and classified; and if his life had been spared for a few years longer he would have advanced our knowledge of that part of geology, and raised us to an equality with our brethren on the Continent and in America. His vigorous mind grasped the geology of Devonshire; and although few yet accept his solution, the final acceptance is only a question of time. His place on the Irish Geological Survey cannot easily be filled, more especially as the solutions of some difficult problems still remain."

JOSEPH BEETE JUKES.

29th July, 1869.

Another hero gone to rest,
Life and fame how frail and fleeting!
A dead calm rules his noble breast
Late thrilled with hope's exultant beating:
The changeful music of the spheres
Hath died upon his listening ears!

Truth-seeker 'mid the mystic lore
Deep carved on nature's marble pages,
He found new gems of shining ore,
Amid the garnered wealth of ages;
He counted nature half divine
And bowed with reverence at her shrine!

Yet worshipped he the higher Cause,
The fount of all created being,
Not squaring faith by reason's laws,
Not scoffing where he failed in seeing:
With reverent awe he, seeking, trod
The teeming harvest-field of God.

Weep, worker, o'er your comrade's tomb
A parting tear! Then still pursuing
Your task, toil on, 'mid gleam and gloom,
For nobler deeds await your doing;
Though labourers fall, the work of Truth
Shall flourish in immortal youth!

J. C. TILDESLE

MISCELLANEOUS.

A writer in the *Press News* offers a salutary caution to such newspaper proprietors as may be favored with orders from "Advertising Impositors." "I find," he says, "there are several sham firms who address their litho-headed circulars from London and some other large towns, who are just now favouring provincial news proprietors with very liberal and enticing orders for advertisements. These advertisement orders are generally print copy on a slip, accompanied by a stylish-looking lithographic circular, and printed order for insertion, with a request to be supplied with a copy of the journal each time of publication. Unless these doubtful favors are accompanied by post-office orders, a reference, or the money is paid before insertion, on application, I would advise all newspaper publishers to look upon them as spurious transactions, and treat them accordingly."—[We consign all such documents to the waste-paper basket—they are not worth wasting stamps on in asking for payment in advance. Several (in the style of "£20,000 to lend") have been received this week and treated as above.—E.B. I. B.]

NATURAL GAS.—Among the undeveloped sources of heat, of which greater or less reservoirs are contained within or upon the earth, natural gas suggests itself to the mind that has been thinking of mineral oil. What are the processes at work in the subterranean laboratories, it is not our purpose to question; but it is certain that the result of one or some of them is the generation of combustible gas like that which we are burning in our streets and houses, and squandering with a recklessness fearful to contemplate, if we at all heed economy in the matter of the blessings that Nature has vouchsafed to us. It may be that this gas is distilled by the earth's internal heat from beds of coal or coal oil; and if so, we may look for the vapour where we find the substance. It is, perhaps, not generally known that the Chinese are, and doubtless were centuries before us, great consumers of gas, if not manufacturers of it. Their borers for salt water often pierce beds of coal, and the inflammable vapour streams out in great jets that reach to a height of twenty or thirty feet. With the tact of civilised gas-fitters, the salt makers catch the gas from these fountains, lead it by pipes to their works, and consume it in boiling down and evaporating the water for recovery of its saline constituents. Then, too, the tubes are laid through the streets and into houses and kitchens, and the gas is burnt for illuminating purposes. The excess—for more is given off than is wanted—is conducted out into the country, and burnt for the sake of getting rid of it. We are not told that the Chinese work engines with their copious fuel, but one would not be surprised to hear that they have been doing so for ages; indeed, we would not be astonished if it should turn out that they have been

telegraphing since the Deluge, and have photographic portraits of their great-grandfathers. The American oil regions furnish an abundant supply of ready-made gas, which has sometimes given gas companies cause to be apprehensive of failing profits. The town of Fredonia, in New York State, is lighted throughout by the outpourings from the terrestrial gasholder, and in many places the natural gas is extensively burnt for steam generation. A notable instance is that of a large brass factory in Erie belonging to Messrs. Jarecki & Co. For more than two years they have drawn their fire and light from an unproductive oil well, which makes up for its barrenness of fluid by an inexhaustible yield of gas. A three-inch main is constantly charged, at a uniform pressure, and conveys the gas from its source, over a distance of 1200 feet, to the factory. The gas is of good lighting quality, and when it is not wanted, as on Sundays and during the night, it is led up a high shaft and set alight *pro bono publico*. What has become of the burning wells once known in England?—*Gentleman's Magazine*.

The new bridge at Ovoca, Co. Wicklow, has been open for public traffic. It is a handsome granite structure, perfectly level, and having three spans or arches. Its length is 120 feet, and width 24 feet, the foundation of the buttresses being 8 feet below the surface of the bed of the Ovoca river. It cost £3,000, which was contributed by the Co. Wicklow. It has been built to replace the old bridge carried away by the floods consequent on the sudden thaw of the snows during the severe spring of 1867. Altogether it is a very creditable work, and supplies an important want—namely, a means of crossing the river between the extreme points of Rathdrum and Arklow. It also adds considerably to the picturesque beauty of the Vale of Ovoca at Bally-Arthur. The work was carried out, from the plans of Mr. Brett, C.E., by Mr. Clark, contractor.

The economy of using lime ground to powder, instead of slaking it in lumps, is the subject of an able report by a French engineer, who estimates the loss in lumps at 25 per cent. Besides this saving of material, it is clear that the mortar will be more easily made, and, being smoother, will be spread with greater facility, thus saving time. It is said further that the mortar sets quicker and is more solid. Lime in powder is also transported more easily than in lump, and we read that the works on the Suez Canal have been executed with the powder shipped from Marseilles. The assertion that lime keeps better in powder than lump, is, we think, open to doubt. Still we are quite willing to believe that many advantages may be derived from the use of the material in fine powder.—*Mechanics' Magazine*.

A series of investigations upon the subject of ventilation and purity of air in our barracks is being made by Dr. de Chaumont, the assistant professor of hygiene at Netley. His experiments are being conducted in the barracks at Gosport and Portsmouth, and we are informed that the object is to obtain data as to the possibility of increasing the number of inmates in each room without severe injury to health. In the belief that this is so, strong representations are likely, we understand, to be made as to the danger of such a proceeding. Overcrowding in our barracks is now a prolific source of disease, and has been proved to be one of the most powerful agents in the production of consumptive maladies. The present allowance of six hundred cubic feet of space per man is, in the opinion of the best authorities, the very smallest that can be safely permitted, and the reduction to five hundred, which has been suggested as a means for accommodating the excess of troops now in England is sure to meet with strenuous opposition.

SCIENCE AND ART.—A striking instance of the immense value a small piece of steel may acquire by the great power of skilled mechanical labour is the balance-spring of a watch. From its extreme fineness and delicacy 4,000 weigh not more than one ounce, and exceed in value £1,000. A most interesting little work, describing the rise and progress of watch-making, has been published by J. W. Benson, 25, Old Bond Street, and the City Steam Factory, 58 and 60, Ludgate Hill. The book, which is profusely illustrated, gives a full description of the various kinds of watches and clocks with their prices. Mr. Benson (who holds the appointment to the Prince of Wales) has also published a pamphlet on Artistic Gold Jewellery, illustrated with the most beautiful designs of Bracelets, Brooches, Earrings, Lockets, &c., &c., suitable for Wedding, Birthday, and other presents. These pamphlets are sent post free for two stamps each, and they cannot be too strongly recommended to those contemplating a purchase, especially to residents in the country or abroad, who are thus enabled to select any article they may require, and have it forwarded with perfect safety.

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The Irish Builder.

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Prize Designs.



CHILDREN in earlier times implicitly believed in the catching of birds by putting salt upon their tails, and we have very little doubt that many of our readers in their juvenile days robbed the domestic saltcellar for the purpose of trying the experiment. But the children of the present day are wiser in their own generation, and are not to be deluded into so wilful a waste of their valuable time. Indeed, judging from some of the instances of transcendent folly and stupidity that turn up daily in our police courts, it would almost appear as if the orthodox course of proceedings were reversed, and that the mantle of credulity was transferred from the children to the parents. Is it, however, only in the catching of birds that it is necessary to use salt? Are not human beings, are not engineers and surveyors, susceptible to the saline influence? We (*Engineer*) ask this question, as very recently designs and plans have been requested for rather an extensive course of engineering operations, and the usual method of offering a first and second premium was resorted to, for the purpose of gathering into one focus the efforts and talents of many different individuals. Let us see if, generally speaking, the ordinary routine of these proceedings will bear out our metaphor. Suppose—as the mathematicians say—that a local board, or any other corporate authority, find it absolutely incumbent upon them, after putting off the evil day until it can be no longer postponed, to devise prompt and effective measures for carrying out a drainage or sewerage scheme, and that they desire to obtain the necessary plans and all other information as cheaply as possible. Obviously the first step is to “catch” an engineer—in fact, as many engineers as can be caught—the more the better. The more engineers the more plans, and the more plans the greater the variety from which to make a selection, openly or covertly. In accordance, therefore, with our metaphor, the engineers are the birds, and the premiums offered the salt wherewith they are caught.

There is not a single instance extant where competitive designs have been furnished, investigated, their respective merits reported upon, and the premiums adjudicated, in which great dissatisfaction has not prevailed. To some extent this state of things is inevitable. The awarding of a prize to one design to the rejection of a great many others, is a wholesale method of instituting invidious comparisons, in a manner far too public to be acceptable or agreeable to the *amour propre* of the unsuccessful candidates. Yet it might be fairly demanded, what else can be expected? They cannot all win, nor even hope to win. Among so great a number of designs as are usually offered in competition, there is always a large proportion which are far below the mark.

Many even do not comply with the printed regulations, which are especially provided for the benefit and guidance of the candidates. Nevertheless, when these imperfect and irregular plans are deservedly rejected, the owners raise a violent protest against the whole proceeding. Our advice to all these, whether engineers, architects, or surveyors, who intend furnishing competitive plans, is, before they incur any trouble and expense in such matters, to satisfy themselves thoroughly on a few points. In the first place, they should never compete unless they consider they have a fair chance of success, which chance has very little to do with sheer talent or professional ability. Having once determined to “go in for the thing,” they should make up their minds to accept a defeat with good grace. A protest or complaint from a disappointed candidate whose design has been rejected, carries but comparatively little weight. At the same time we are free to admit—from the numerous letters that have appeared from time to time in our columns respecting alleged partiality and unfairness in adjudicating premiums—that in some instances the complaints have been justly founded. It is true that the parties advertising for plans, and offering the premiums, may say, “We do not compel anyone to send in plans. You all of you know the conditions attached to the competition, and if you choose to compete you must abide by them. But do not call us to account because you cannot each be successful candidates.” In the main, this is correct enough, but it must be borne in mind that there is such a thing as laying a trap for the unwary to fall into, by offering specious terms which may never be fulfilled, and in keeping them to the ear but breaking them to the hope. There have been instances known where plans and designs were rewarded with a premium, when the said plans did not even comply with the conditions published in the printed regulations. It is needless to remark that these should have been summarily rejected, and returned at once to their owners.

Very recently an advertisement appeared offering premiums for a plan and report respecting the best possible method of draining an extensive district, of disposing of the sewage, and also improving the present water supply. For the first and second best designs premiums were offered, the respective amounts of which appear very disproportionate, especially when it is borne in mind that, *ceteris paribus*, the expenses attending the preparation of the plans will be the same, and will not be half covered by the smaller sum, even if they do not exceed the larger. The first sum, about a hundred pounds, seems a good deal of money until you know what has to be done for it. The requirements with regard to the plans and sections are onerous enough in all conscience, and will necessitate the obtaining of a large amount of personal knowledge of the locality and surrounding neighbourhood, which can only be acquired by an actual sojourn in the vicinity. What may be termed the personal survey and reconnaissance will be of a very arduous character. Still, all these features are limited, and have a tangible termination, and, moreover, may be treated more or less in detail, according to the opinion of the intending candidate. But there is one proviso in the printed regulations which suggests the idea, that the successful competitor may be let in for a great deal more than he contemplates. The paragraph alluded to runs thus: “In the event of the board borrowing money

to carry out all or any of the preceding works, the engineer whose scheme is adopted must supply, free of expense, all information which may be required by the Home Office when granting the necessary powers for borrowing.”

To our own knowledge, this “information” is being afforded the Home Office in the shape of an inquiry, by a local board, under similar circumstances, which has lasted upwards of a week and has been adjourned until next session, when in all probability it will last another week.

A London engineer would find that to give a week’s time in a place remote from the metropolis, free of expense, would make a small hole in the premiums offered. The period over which the duties, or rather the liability of the successful candidate would extend, is certainly very indeterminate, and might be spun out by the proverbial slowness of the Government officials to almost any length. It is to be fairly supposed, moreover, that the premium—at least not the whole of it—would not be paid until all information had been afforded the Home Office. Manifestly otherwise the board would have no further hold upon the engineer, who even in that case might ultimately find it more to his advantage to forego the payment of any balance that might be due to him, and leave the board to settle with the Home Office in the best way it could. As the majority of premiums run, the offer we refer to is what would be called a liberal one, were it not for the large amount of work that is required to be done for it, and the indefinite work put on the engineer in the paragraph quoted. The proper course would be to adjudge the premium on the merits of the plans and report, and let any further negotiations depend upon mutual agreement.

There is another light in which this subject of premium may be viewed, and that is the proportion which exists between the amount of the premium and the cost of the works, which are to be executed according to the designs sent in. Recently a premium of £50 has been offered for designs which would embrace the construction of works estimated to cost, as a minimum, £6,000. In other words, an engineer is offered less than 1 per cent. for the preparations of plans, or about a fifth of what they would cost if furnished by a professional man in the usual manner. Certainly, in the present depressed state of the profession, there are many competent engineers who would be glad to prepare plans on the above terms, and no one can censure the parties who choose to avail themselves of the fall in the market. Still, at the same time, this will not make the principle right. No engineer who had any work on hand, or who had not more time to spare than he knew what to do with, would listen to such conditions for a moment. Moreover, there is this important fact to be borne in mind by parties offering premiums for plans—for one competent engineer who sends in a design, there will be a dozen incompetent candidates whose contributions are not worth the paper they are drawn on. It does happen sometimes that one of these worthless designs is selected, and the works constructed from it. In such a case the result soon becomes apparent, but the parties have nobody but themselves to blame for it.

A stained-glass monumental window, of large dimensions, in Clonmore parish church, Co. Wicklow, has been wantonly and maliciously smashed with stones.

HOTEL FOR WORKING WOMEN,
NEW YORK.

IN order to provide suitable homes for industrious young men and women, Mr. Alexander T. Stewart has devoted six millions of dollars to the erection of buildings for work-people. His plan includes the construction of two grand structures, which may be called hotels. On Fourth Avenue, between Thirty-second and Thirty-third Streets the excavation is already made, and the foundations begun, for the first building, which is intended as a home for young working-women. It is to be constructed of iron, thoroughly fire-proof, and will have three fronts upon the three streets named. On Fourth Avenue the frontage will be 192 ft. 6 in.; on Thirty-second and Thirty-third Streets, respectively, 205 ft. The area covered by the whole structure will be 41,000 square feet. The main building will be six storeys in height, with an additional story in the Mansard roof. This style of roof, named from Mansard, the French inventor, who died in 1666, has for its peculiarity an upper and an under set of rafters, the upper set more inclined to the horizon than the under set. The steep or other pitches of this roof will be of slate, upon iron laths. Over the central portions of each front, and extending a space or width of 100 ft. on each, will be an additional story, with a superimposed Mansard roof, making the centre of each front eight storeys high. At the extremities of each of these central elevations, as well as upon the street-angles of the building, the design shows turreted towers, each 24 ft. in width and height. These towers are ten in number, and varied in design. With pinnacles rising from their angles, they will doubtless form graceful crowns to the whole structure, and give lightness and airy elegance to the otherwise heavy mass of columns and windows. The colour—pure white—will also assist in this respect. The entire central height will be 109 ft. The main portion of the building to the entablature will 90 ft., and the roof adds to this 12 ft. at the sides and 18 ft. at the centres. The general effect of the architect's idea will undoubtedly be very imposing.

The principal entrance on the Fourth-Avenue front will have a width of 48 ft. The portico will be two storeys in height, and unique and beautiful in design. It will consist of massive cluster-columns, with foliated capitals and bases, on octagon-shaped pedestals. The designs of the different storeys—their piers, columns, pilasters, and arches—are likely to be effective. The first story will contain twenty-four stores, each 52 ft. deep by 17 wide, and handsomely finished with plate-glass windows. The rents from these will materially assist in meeting the pecuniary needs of the institution.

The interior will be reached by a wide staircase through a vestibule, which, with its tall and massive pillars, will more nearly deserve the descriptive term *grand* than many places to which the word is applied. Beyond the vestibule will be a hall paved with marble, 30 ft. wide, with double flights of stairs leading upward, and these having spacious landings. Those whose knees quake at the thought of eight storeys to climb will feel relieved at the sight of the comfortable elevators on each side of the staircases, and running from the first to the upper story. Enough space for fresh air in the rooms will be secured by the height of the storeys—the first (for stores), 19 ft. 6 in.; second, 14 ft. 2 in.; third, 13 ft. 6 in.; fourth, 12 ft. 6 in.; fifth, 12 ft.; sixth, 11 ft. 5 in.; and the roof-story, 7 ft. 11 in. The interior courtyard will be 94 ft. by 116, affording thus a fine breathing-space for the occupants of the interior rooms. The hollow square thus formed by the surrounding walls of the building will be something imposing, even beautiful, with the gold-fish and the fountain. The basement will be 14 ft. below the level of the street, and its vaults will reveal the massive masonry which, Atlas-like, will shoulder the peopled iron world above. There will be a great engine for generating steam for heating the building, for raising and lowering the great elevators, for driving the vast fans that

are to cool the summer air, and for lending iron sinews to the kitchen and the laundry. There are to be ventilating-shafts from top to bottom, 8 by 10 ft. The kitchen and the laundry arrangements are to be upon the most improved hotel plans. The hotel-offices are to hold the persons who are to aid in the comfort of the inmates. Let us hope that the conventional hotel-clerk, with his unapproachable dignity, will not be there. In the back part of the building, where there can be no stores, and where the contact with other buildings would impede the free access of air and light which all of the rooms are to have abundantly, the laundry and kitchen will be situated, and, above them, the large halls for various purposes. One of these will be the dining-room, conducted on the restaurant plan, 30 ft. by 92 in dimensions. The great halls for lectures, concerts, and other recreations, and for the reading-room and library, will be of the same size. The sleeping-rooms will be of two kinds—the larger ones 16 by 18 ft. in space, and intended for two sisters or two friends rooming together; the smaller ones, 8 ft. by 9, for one person only. Experience in institutions of the kind shows that applicants usually have a marked preference for single rooms, and the moral advantage of this is no doubt very great.

The entire arrangement promises, to each working-girl who becomes an occupant, the comfort and convenience of a hotel, at an exceedingly small cost. Each one pays at the fixed rate for lodging; the *benevolence* of the idea consisting in the fact that each occupant is enabled to secure more of comfort and elegance than is ordinarily in the reach of the honest poor, at a cost even less than would otherwise attend the cramped and squalid rooms of the ordinary tenement-houses. The food will be furnished at cost, and each person will be enabled to regulate her expenses in proportion to her ability or inclination.

HOUSE-FRONT WASHING IN PARIS.

THERE are three methods, and we may say three degrees of severity of front washing-down employed in Paris, for all of which a most complete and simple apparatus has been devised and constructed, so that the work is done cheaply, rapidly, and by contract. These we proceed to describe. The scaffolding from which the front face of the house or other building is reached is nearly always the same, and of either one of two distinct types. It consists either of simple spars thrust out from the top windows, or over the front parapet, and balanced at the inner end, from which hang the top blocks of purchase-tackles (usually 3 and 4 sheaved), the lower blocks of which are fast to a railed-in wood gallery of about 0.75 metres wide, and from 10 to 15 metres in length. Upon this the workmen stand, and are enabled with safety to raise and lower themselves without quitting the scaffold. Or, in another form, two lofty and stout, taper, heavy spars or masts are fixed nearly upright, but leaning towards the front, and at about the length of the wood gallery apart, the butts resting upon the curb or edge of the *trottoir*; these are secured by guy-ropes across the street and laterally; from their summits hang the top purchase-blocks, as above, the lower ones being, as before, fast to the railed-in wood swinging-gallery or scaffold, the tackle falls being brought down to a small and simple *crie*, or wheel and pinion crab purchase, secured to the butt of each upright mast. In this case one labourer below manages the raising or lowering of the gallery at the command of those upon it, raising or lowering one end first, by say a couple of feet, and then the other to restore the level. A third more expensive and more complete form of hanging scaffolding is occasionally in use for public or other very large and lofty buildings. For the masts above, two vertical pieces of framed horsing of the required height are substituted, the plane of each being at right angles to the face of the building. These have flanged rollers under them at the base, the planes of which are parallel to the face of the building, and they

run upon rails either of wood or of iron, and so can be "pinched along" from end to end of a long building. The railed-in gallery or scaffold is hung as before, but both tackle-falls converge to a single crab-purchase barrel, which is actuated by a small locomobile engine of the coffee-pot type; this having other functions also about now to be described.

The washing is performed either by cold water, by boiling water, or by the high-pressure steam and boiling water alternately; and these three methods conform to the three degrees of severity in washing before referred to. When, as in the first case, cold water alone is used, the latter derived from the street mains, or from the nearest street-channel hydrant, or from some temporary source, is pumped up from the level of the pavement through vulcanized india-rubber hose, and from the extremity of a bent jet-pipe of about two feet in length, provided with a small and flattened adjutage, is delivered with great force right against the face of the stonework, the nose-pipe being held at about four to six inches distance from that. As the washing thus proceeds by the hands of one man, another comes after him with a second jet-pipe of less power, and by its aid, and that of suitable brushes, removes any fragments or whatever is detached by the first, and so completes the washing, beginning at the very top, and going steadily from end to end in horizontal courses, descending to the base.

The pump is not unfrequently a double one, made like a ship's deck pump, upon a portable base, bolted down to a surface of planking and worked by two labourers; but the more complete establishments have steam pumps attached to the engine. For the second and third sorts of washing, if pumps be employed, steam pumps are indispensable, and made with metallic valves and plungers, as pumping boiling water.

Buildings that are tolerably new or clean, or that have been already somewhat recently washed, only need washing with cold water in this way; floods of sullied water flow down the frontage, but very little stone seems to be detached by it, and with the close, well-jointed stonework of modern Paris, and the good mortar, or gypsum plaster employed for jointing, very little of the pointing is washed out, any that may be being replaced. Where the frontage is longer without washing, or is very dirty, by the grain of the stone being of a more open character, or otherwise, then boiling water, delivered just as above, is employed for the washing, the finishing off of which is sometimes done with hot, but usually with cold water and brushes. The difference in effect between the application of cold and boiling water is very evident, and under like circumstances the latter detaches much more grains of matter from the face of the stonework.—*Practical Mechanic's Journal*.

OUR MARKETS.

IN our last issue we noticed the City Engineer's report, and gave some few extracts therefrom. On the important subject of the necessity of providing convenient markets in our city, he says:—

There is no city, I believe, in the United Kingdom worse off for good general markets than Dublin. When it is observed the fine markets that are erected in Liverpool, Manchester, Birmingham, Newcastle, Glasgow, and in all the large towns and cities in England and Scotland, also that Cork and Belfast have good markets, it appears strange that Dublin should be an exception. Castle-market, Clarendon-market, Ormond-market, and Coles-lane-market, are all fast falling into decay, and the best class of butchers, &c., leaving them and establishing themselves in the streets, which is not considered desirable.

In 1860 Mr. James Malley and others promoted a bill, and carried it through Parliament, for the establishment of two large covered markets, one to be on the north side of the city, on the site of the Cole's-lane-market, and the other on the south, on the

site of Castle-market. However, although considerable expense must have been incurred in procuring the Act, nothing further was done, and the powers obtained are now extinct.

I consider there ought to be two such markets erected in Dublin, where almost every article could be sold under the one roof, as in the large markets I refer to. On the north I think the site of Ormond-market would be the best. This would have a fine open front to the quays, which would form a good approach to it for all classes; and, being in close proximity to the present wholesale fish, vegetable, and fruit markets, renders it particularly well suited for the purpose. On the south side, I think the site of the Clarendon-market is the best that could be chosen. To purchase the necessary property to build a new market on the site of Castle-market would be very costly; besides, the line of the Dublin and Rathmines Railway is proposed to cross it, and I believe part of the market will be required for the proposed station buildings.

I estimate that, irrespective of the purchase of the ground, two handsome markets could be built for about £25,000. With regard to the property necessary to be acquired for the purpose of erecting markets on the sites I mention, it is now chiefly of the most miserable kind; but we find that when such property is required for public works or improvements, the value set on it, *and sworn to, is prodigious—ten times—aye, often twenty times the real value; and it frequently happens that juries support by their verdicts these preposterous claims;* and this is undoubtedly a great obstacle to attempting public improvements, and certainly the present law requires great amendment; and some tribunal, *presided over by competent professional men,* should be created, to assess the fair and equitable price to be paid for property required for public purposes, as is the case in Paris, where, if the English system prevailed, the magnificent improvements in opening up new boulevards and streets, carried out by direction of the Emperor, could not possibly have been effected.

SIGNALLING ON RAILWAYS.

MR. S. A. Varley read a paper at the recent meeting of the British Association, on the subject of "A New System of Communication between Guards and Passengers on Railways." The author gave a description of a system of communication which was applied first in 1866, and is at the present time in use on the Royal train in which Her Majesty travels to and from the North. The system referred to had also been applied to an ordinary train, and daily used for more than eighteen months. The application of electricity to signalling in trains, considered as an electrical problem, was a simple one. The mechanical difficulties in its application, however, had been somewhat complex; and the solution of these difficulties had depended chiefly upon the mechanical construction of the various parts. The conditions laid down by the railway authorities as necessary were, that the system should be simple, and not liable to derangement, that passengers should be able easily to signal in an emergency, and that the apparatus should be detective, to prevent the repudiation of a signal when once given. Besides this, it was suggested, for the sake of economy, that the apparatus should be portable, so that it could be moved from one train to another if required. Numerous electrical systems had been proposed, but only three had been practically applied. The first on the list was Mr. Preece's, in use on the London and South-Western Railway, the second was Mr. C. V. Walker's, in use on the South-Eastern Railway, the third was the joint invention of Mr. Martin and the author, and in use upon the London and North-Western Railway. In the author's system an insulated wire was run underneath the carriages; the coupling bars and ironwork of the carriages were connected electrically together, and the circuit was completed when the apparatus was in use through the

insulated wire, the apparatus, the ironwork, and the railway metals. Two insulated wires the one connected to the ironwork, the other to the insulated wire—running underneath the vehicles, were led up into the compartments of each carriage, and, bringing these into contact with one another, closed the circuit through the galvanic batteries and the alarms in the vans and upon the engine. The connexions between vehicle and vehicle composing the train were effected by means of two coupling ropes containing flexible conductors. This enabled the carriages to be joined together at either end, and gave a double connexion between each vehicle. Malleable cast-iron eyes were attached to the ends of the coupling ropes, where the connexions were made; and these were grasped by strong iron hooks, actuated by powerful springs, placed in cast-iron boxes attached to the carriages. The eyes of the couplings were coated with copper at the points of contact, and pressed against a plate of brass attached to the hooks. By this means very perfect contact was secured. The apparatus in the vans consisted of a battery and an electrical alarm. These were placed in boxes, and the connexions were made by simply hanging them on brass studs. The vans were supplied also with ringing keys, to enable the guards to signal to one another. The apparatus on the engine was a portable alarm, and the power to work it was obtained from the galvanic battery in the leading van. The carriage apparatus consisted of a lever handle in a metal box, which when pulled closed the circuit and became locked. All the alarms were set ringing, and continued to ring until the apparatus had been re-set by a special key. The cost of maintenance was almost nominal, and no electrical knowledge was required in its management. All the operations of testing being mechanical, the connexions also being double, any faulty coupling was readily detected, and the system rendered most trustworthy, as the apparatus would work even in the unlikely event of a faulty coupling in every carriage. To meet the wishes of the Board of Trade, some of the railway companies had electrical systems applied to ordinary passenger trains; and the system referred to by the author was fitted up on an express train running 250 miles daily, between London and Wolverhampton. This train was started from all the stations at which it stopped by means of the apparatus, and its working reported by the guards; and in this way it was tested 22 times daily.

CLONAKILTY ROMAN CATHOLIC CHURCH COMPETITION.

In a limited competition for a new Catholic Church of very considerable size at Clonakilty, Co. Cork, the design by Mr. G. C. Ashlin has been declared the best. We understand that the work will be immediately proceeded with.

THE DRY-EARTH SYSTEM IN CAMPS.

It is a little curious that the regulations laid down by Moses for preserving the cleanliness of the Israelitish camp have been substantially adopted by the Government of the Madras Presidency, and that a Colenso has arisen to call in question the infallibility of this Mosaic dispensation under the form and style of the "Army Sanitary Commission," whose "Memorandum" on the subject has recently been circulated. The former document, if we understand the matter correctly, is either a transcript of those issued by a somewhat celebrated commercial establishment in London, or is based thereon. It purposes to show that dry earth is the best known deodorant, and that, under all circumstances, it presents the most unexceptionable means for settling on a satisfactory basis the vexed question of human exuviae. There can be no doubt that the dry-earth system merits all that can be said in its favour, even by its most interested advocates. We can ourselves

bear out their assertions from experience on a small scale. But to all general rules there are exceptions; and it would seem in this instance that more than one grave objection has been discovered to the employment of the system in modern military camps. The attention required to work the system will always prove a barrier to its adoption, where inducements are not held out for the preservation and ultimate utilisation of the products. In localities where an extensive area of waste land, especially sterile land, is at a distance convenient for the conveyance of the product by cart, and where labour is cheap and remunerative, the dry-earth system is unexceptionable; but to be remunerative it is important to collect both the solid and liquid excreta, and with respect to the latter, the difficulty becomes at once apparent. The combination of sewers, flushing, or drains, is perfectly incompatible with a dry arrangement. The expense of removing the two elements—solid and liquid—together, need not exceed the passage of the latter alone; the value of the former, in its unity, is too trifling to justify expense, especially where arrangements already exist for the discharge of both.

Of the intrinsic value of human ordure, where its application can be provided for, there can be no doubt. It possesses a mercantile value; its worth as a fertiliser far exceeds any price hitherto accepted, but as gold may be bought too dear, it behoves the authorities to be well advised by both chemical and engineering authorities that the advantages over an already established principle are so paramount as to justify a change. In a strictly sanitary point of view the dry-earth system is not to be regarded as a plan without an alternative. Other and more efficient methods have received the sanction of the highest medical authorities. The means, though suspended by prejudice, favour, or imbecility, are still obtainable. Latrines, capable of accommodating fifty or sixty men, have been perfectly deodorised in five minutes at a very inconsiderable cost, and, if desirable, the whole of the contents removed by sewers could be utilised with much greater advantage to the adjacent land, and with more freedom from smell, than by the costly process of carting. As a general principle it must be admitted that soldiers are not the class of men to feel a preference absolutely for manual labour, and much less would they be disposed to volunteer for it if it entailed on them disagreeable duties. Besides, it is questionable whether it would be politic to engage them in such duties as would provoke the question of unfitness. A large accumulation of the compound in question would necessitate first the carriage of earth to the station, secondly the occasional drying of it, and thirdly the difficulty of conveyance of the compost. At certain seasons the latter would have to be stored away, as it is only at stated times it could be applied, and even then it could only be rendered available within a short radius of the spot where its accumulation would take place. Then would arise the difficulty of the vast preponderance of liquid over solid—in the proportion of some 200 to 1. The absorption of the first renders its removal by dry earth practically impossible, as it would require too large a quantity to be worked under ordinary circumstances. It must not be forgotten that the united influences of heat and moisture invariably favour decomposition, and that this encourages the objectionable odour, and the direful miasms which it is the duty of the custodians of the soldier's health, and the privilege of science, to obviate. It is difficult, then, to conceive that the authorities can seriously contemplate the adoption of a system involving so much certain difficulty, with so little probable advantage, as the dry-earth system—a revolution by which there is much to lose, and where the advantages are doubtful and distant: an expensive process on trial in preference to a tried and approved method; a scheme difficult even on a limited scale, but abounding in insuperable obstacles on an extended one.—*Broul Arrow.*

NEW WING AT THE LORETTO CONVENT, FERMOY.

THE subject of our illustration is a new wing which is being built at the Loretto Couvent, Fermoy. As will be seen, the ground falls to the front very rapidly, and advantage has been taken of this to introduce a two-story building in advance of the chapel. The division between the two sections of the building is marked by a tower, containing staircase to a large dormitory, which occupies the entire first floor of the building in front, and also communicates with the organ gallery of chapel. Under the dormitory is a fine recreation hall, 80 ft. by 28 ft. The chapel is 82 ft. long and 28 ft. wide, and terminates in a semi-octagonal apse. The ceiling is groined, the groining carried on marble shafts, with carved caps and moulded bases.

The building is being executed by Mr. Newstead, builder, Fermoy, at a cost of £3,500. The materials employed for the walling are red sandstone, and white limestone dressings.

The architect is Mr. G. C. Ashlin, of St. Stephen's-green, Dublin.

ART-WORK IN BRASS.

Two beautiful new tabernacles have been recently fitted up in the high and side altars of St. Peter's Catholic Church, Belfast, for the Rev. W. Blayney, Adm., under the direction of Mr. T. Hevey, architect, by the well-known artists, Messrs. Earley and Powells, of Camden-street.

The plate for the high altar has a margin of foliage, picked out with green, and in the centre a cross, most elaborately engraved, and enriched with five amethysts. The void left for the reception of the tabernacle being so unusually large—2ft. 6in. wide and 2ft. 6in. high to springing of arch,—the architect reduced the width of tabernacle to a reasonable size by introducing a border of stone 4½in. on each side, and a tympanum in the head, elaborately carved with vine foliage, which is carried round the tympanum, in the centre of which is carved in high relief the Pelican Feeding her Young. The safe and plate for the altar of the blessed Sacrament is smaller, and is most artistically treated, the sacred monogram forming the chief feature in the design.

The work has been executed by Messrs. Earley and Powells in a style which will fully sustain their high reputation, and has deservedly elicited a large amount of admiration from those who have seen it.

STEEL RAILS.*

THERE are not wanting signs that an important era is approaching in the changeable history of railways. The expiration of the Bessemer royalty will considerably reduce the price of steel rails; and railway managers will be strongly tempted, in consequence, to employ this description to a much larger extent than hitherto. The boldest movement of which we have yet heard in connection with the substitution of steel for iron rails, is stated to be in contemplation by the Paris, Lyons, and Mediterranean Railway Company, which is credited with the design of laying steel rails throughout the whole of its great main line from Paris to Marseilles, a distance of no less than 600 miles. The English railway companies are even now using steel rails to some extent, and more particularly in yards in which a considerable amount of shunting has to be performed. On the Manchester, Sheffield, and Lincolnshire system an examination was made with great care, recently, of some steel rails, which had been laid down in the Woodhead tunnel. One of the examiners was Mr. Zerah Colburn, who is no mean authority upon the locomotive and railway

matters generally. A heavy traffic is well-nigh continually passing through the tunnel, but after the steel rails had sustained the burthen of this severe wear and tear for several months, no appreciable deterioration was observable in them. A similar report recently came under our notice in connection with a line in the United States; and concurrent testimony on all sides seems to prove conclusively enough that, for durability and ultimate economy, steel rails will prove a great boon to the railway world.

It is not only that steel rails are more durable, but they are also much safer. A steel rail fish-jointed line presents a very great advance upon the old-fashioned iron rail system, put together merely with the aid of ordinary chairs. If any one doubts this, let him take a walk upon some little country branch innocent of fish-jointing, and laid with rails of the old-fashioned type.

The impression which will be made upon his mind is, that it is no wonder that a train should now and then run off, but that it is a matter of surprise that *déraillements* do not more frequently occur. We say this, because the surface of ordinary rails, useless they are frequently renewed, will be found, here and there, to have become jagged and worn; while, in the absence of fish-jointing, almost every third or fourth chair-joint is a little amiss. It is the projections at these joints which add so greatly to the fatigue, discomfort, and danger attendant on travelling on a badly laid line; and although the tremendous onward rush of the locomotive has generally a tendency to keep the train where it ought to be, and so to cover a multitude of small sins in the permanent way, still the difference is perceptible enough when one gets on to a fish-jointed road, and it is still greater when the advantages of fish-jointing are enhanced by the use of steel rails.

It is impossible to predict what effect the extended use of steel rails will have upon the ordinary iron rail trade, but it can scarcely fail to have some influence upon it. Although we do not suppose that many other companies will be bold enough to follow the policy attributed by anticipation to the Paris, Lyons, and Mediterranean, still the tendency will undoubtedly be to put down steel rails, where practicable, instead of iron rails. Of course, if a kind of mania set in for steel rails the price would soon rise, royalty or no royalty; but the question is whether the production of steel rails will not be increased in an almost equal ratio with the demand. The only point which tells in favour of the maintenance of a large demand for iron rails is the consideration that upon a vast extent of new line, now in course of construction both in America and in Europe, the traffic will be feeble for many years to come, whatever development it may ultimately acquire, and in these cases iron rails would naturally be regarded as answering every useful purpose for the present. The same remark would, probably, also apply to the 10,000 miles of new line about to be undertaken by the Indian Government, and also to a large extent of light and cheap lines which, in all probability will be carried out during the next thirty or forty years in Australia. The railway future is, in fact, so vast that he would be a bold prophet who would venture to speak too confidently upon it. But that the use of steel rails is extending and will still further extend no reasonable man can scarcely doubt. We are disposed to view the change with satisfaction, as it will increase the security of railway travelling, diminish, eventually, the cost of maintenance, and add, by consequence, to the stability of such railway properties as are administered in other respects with an ordinary measure of common prudence. As for this common prudence, the past history of British railways has, unfortunately, shown that it is not always forthcoming, and that the economies of one department of railway administration are sometimes neutralised by the recklessness displayed in another. Let us hope, however, that the wearisome lessons of the past will not, even in this respect, be without some beneficial effects upon the future.

NEW CATHOLIC CATHEDRAL, CORK.

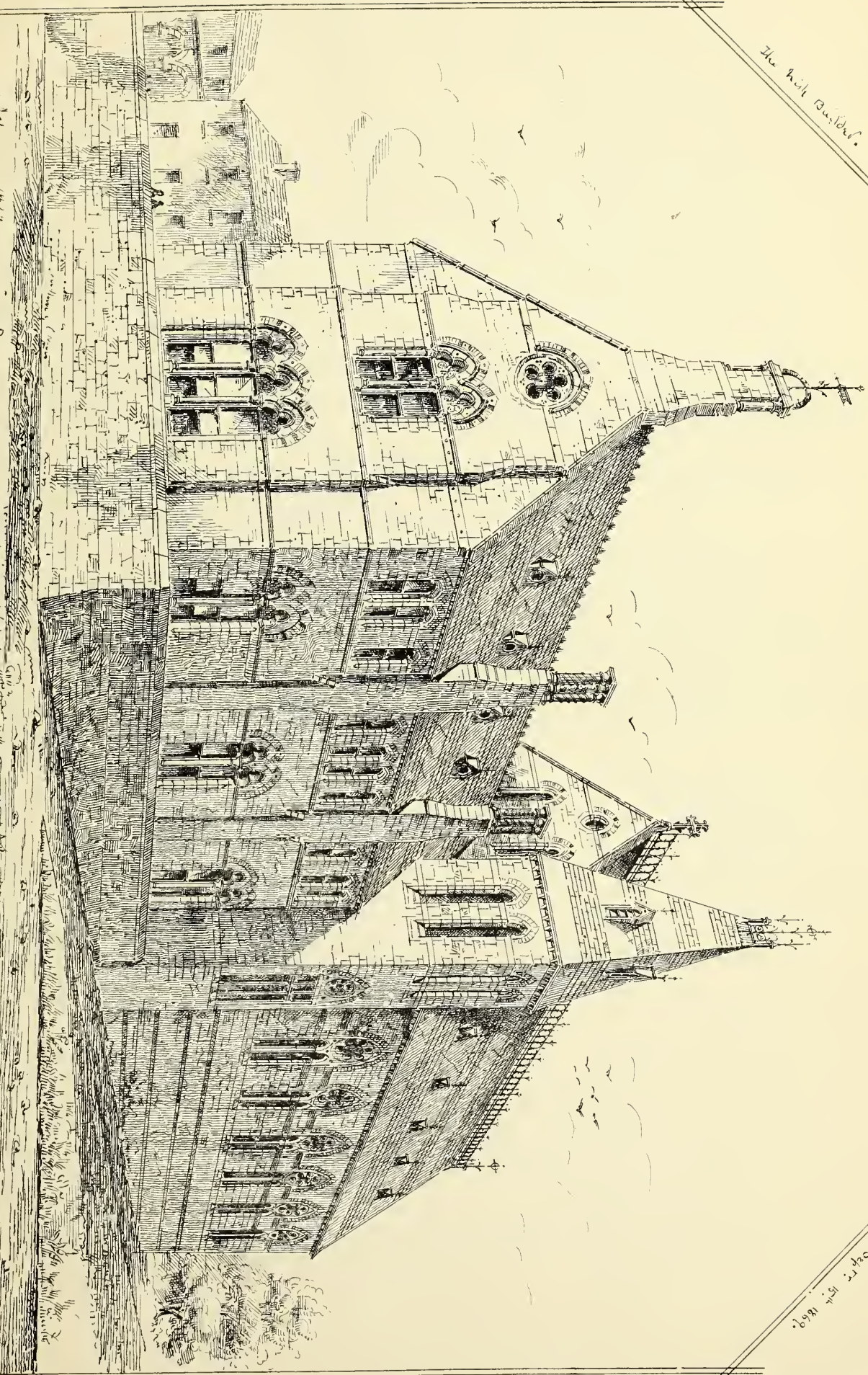
HAVING already given an outline of the plan on which the cathedral is to be built, we (*Examiner*) propose to offer a few details which suggest themselves on an inspection of the drawings. And first, we may remark, that the drawings themselves are exceedingly beautiful, and cannot fail to afford the utmost gratification to all who have a taste for art, whether pictorial or architectural. The perspective views of the exterior and interior are very fine, and some of the sectional drawings are remarkable for precision and beauty of detail.

The cathedral, as designed in these sketches, will be a noble building, and worthy of a great effort on the part of the people of Cork. It will possess in a striking degree that dignity which is the essence of such a structure. The design is at once lofty, massive, elegant, and full of that variety which is a characteristic of Gothic, but which above all others most properly marks a building of cathedral proportions. The transept will cross the nave at an equal elevation, the ridge of both being 80 ft. This transept will have a length of 114 ft., while from east to west there will be no less than 237 ft. within the walls. The gables of the transept will be of an exceedingly rich character. That at the south side will have a deeply-moulded porch, with a carved tympanum, the triangle above the archway being perforated, which will give to this part a peculiarly ornate appearance. Looking from before this porch there will be seen at either side portions of an exterior which cannot fail to have a very grand effect. Eastward the choir will be seen flanked at either side with double aisles, which within constitute chapels, this part being linked to the transept by a flying buttress. Below, square and solidly-built sacristies give an aspect of security to the slighter superstructure. Westwards the view is carried past the south aisle and clerestory, and terminates in the tower, which now stands, to the top of the parapet, 157 ft., and when crowned with a spire will rise to 280 ft.

Entering by the transept door the cathedral cannot fail to present a most striking *coup d'œil*. Glancing at the perspective drawing one not acquainted with its object would be inclined to ask, "Of what magnificent continental church is that a portion?" And we have no doubt that the realization will prove singularly effective, for there will be presented at once to sight, through a rich confusion of pillars, no less than five altars, the high altar standing in the centre, the others forming the termination of those double aisles of which we have spoken as running alongside or forming part of the choir. Advancing to where a full-length view of the church can be had the appearance cannot fail to be striking. A clear view from end to end of a building, so long, so lofty, and lit at either extreme by large and handsome traceried windows, will at once convey the idea of vastness. Nor will that of beauty be wanting when the details are examined. Above a long arcade resting on round stone columns, about which will be clustered parasitical columns of marble, will rise an exceedingly graceful triforium, and over its arches the clerestory windows, thus forming the three storeys which competent critics say are most harmonious. The skin of the nave roof will be of open woodwork so arranged as to be suitable for coloured decoration. The aisles will have a groined roof of stone. Beyond the crossing or transept the choir will differ somewhat from the nave. As the floor will be raised by a series of gradations so as to give due elevation to the altar, it was thought advisable to cut off the triforium in this part and let the main arcade have the benefit of the greatest possible height. The idea has been a very happy one, and is calculated to enhance very much the stateliness of this part of the church. Without entering into minutiae we may state, that this part, as is natural, is more profusely decorated than the body of the church, but there is no departure from the style in which the whole plan has been conceived. This is the Geometric, which is

* From the *Colliery Guardian*.

The high Builder.



No. 234. Sept. 15th. 1869.

NEW WORK, AS THE WORKS OF CONVENT FOR PERMANENT, C.C. ASHALL, ARCHITECT, DUBLIN.

THE LIBRARY
OF THE
UNIVERSITY OF MICHIGAN

just a stage earlier than the Perpendicular and perhaps one of the purest periods of Decorated Gothic.

To those of our readers who are not conversant with figures as represented in stone, we may say that the dimensions we have spoken of would make the Cathedral of Cork equal in size to St. Patrick's, in Dublin. The design is one which reflects the highest credit on the skill and originality of Sir J. Benson. When completed, it will prove to the city of Cork, not merely an ornament in the ordinary sense of the word, but a something which will enable Cork people to boast that they possess the finest ecclesiastical structure in Ireland.

MARRIED SOLDIERS' QUARTERS.

THERE is, probably, no department of barrack accommodation which needs the application of a little common sense more than that which deals with the accommodation of our married soldiers. So long as soldiers are permitted to marry—and this is only reasonable for those who spend the greater portion of their lives in the service—it is but right that they should be housed as well as horses, and not three or four families crowded into one room, as we have repeatedly seen in many of the garrisons.

In the future buildings, four great and necessary improvements need to be kept in view. 1st. Whilst a good-sized single room, with a recess for a bed, is amply sufficient for a man and his wife without incumbrance, extra accommodation is required where there is a large family. 2nd. As, however, it is unreasonable to provide in all cases for a large number of children, it is most desirable that each married block should be provided with a common sleeping-room for children, and an infant-school or day-room. This may be built at the top of the block, as it is at the Marine Artillery Barracks, near Portsmouth. To this nursery the children are sent to spend the day when the mothers are busy cleaning up their rooms, or washing in the wash-house. In the dormitory they sleep at night, instead of in company with their parents. 3rd. Some arrangement is absolutely required for the storing and preservation of the food. At present there is generally a cupboard in the room; but it is close to the fireplace, and therefore both hot and dry. In warm weather it is quite impossible to preserve meat in it for many hours. The butter melts, and the bread becomes stale and tasteless. The waste and inconvenience are very great; for the rations, often served out only twice a week, spoil, and there is a continual going to the canteen to buy, a journey which is by no means desirable for a married woman. There should, therefore, be a common larder in the basement of the building, or at the north end of each floor. This larder should have a series of large ventilated pigeon-holes or safes, which would be cool and free from vermin; and, if under lock and key, would be a greater boon, the more so as the removal of the food from the living-rooms would go far to destroy the vermin which now so generally infest them. The storing of coals in the rooms is very generally obviated by placing them in the corridor outside; but the practice is untidy, and there surely would be no difficulty in building a small common coal-cellar in the basement, on the same plan as that for food. 4th. One of the greatest obstacles to cleanliness and health is the necessity of washing-up and storing the pots and pans in the ordinary living-room. On each floor there should be a common scullery, provided with water, and a certain number of sinks, with some rough shelves upon which the pots may be tidily stowed away.

In recommending these very necessary improvements to new married quarters, we are quite prepared to meet the usual objections that they are impracticable, that they would not be used, that the water would run to waste, and the sinks be filthy,—in fact, that soldiers' wives are incapable of appreciating such comforts. This, however, we entirely deny. There should in all cases be told off a woman, whose duty it should be to see that

the kitchen, &c., are kept in proper order; and as we have over and over again recommended that a special sanitary officer should be placed in charge of barracks, he would be responsible for the arrangements being duly carried out. We cannot close this subject without hoping that, as regards the larder, scullery, and children's dormitory, something may be done to the existing married quarters. We hope that Her Majesty, who has always evinced so deep an interest in the comfort of her married soldiers, will not cease to exert it in favour of the recommendations we have made.—*Lancet*.

BELFAST NATURALISTS' FIELD CLUB.

THIS society has issued its sixth annual report. Its object, we may remind our readers, is "the practical study of natural science and archaeology." It is highly satisfactory to be able to record that this body is making advances in its career of usefulness, and that its committee can congratulate the members on its prosperous condition. There are now, we learn, 180 members on the roll. The few who, from time to time, join the club for mere novelty, drop off again as readily; but the great majority of the members now enrolled have joined either from their love of the society's pursuits, or for the purpose of aiding those interested in carrying out its objects. The treasurer's account shows a balance on the right side.

In the report before us we find interesting accounts of six excursions made during the summer session of last year; also abstracts of the papers read at the winter meetings, the first one being by Shakespeare Wood, Esq., on "The Colosseum of Ancient Rome."

"The club," we are told, "still enjoys the very great advantage of meeting in the rooms of the Natural History Society, and the committee hope that the good feeling existing between the two societies may continue to the advantage of both."

"It has long been felt that there should be, in the Belfast Museum, collections illustrative of local natural history, archaeology, &c., and the committee are of opinion that this society might do something towards providing these collections, if suitable provision were made for their exhibition by the council of the Natural History Society."

"The committee had the advantage of consulting with a deputation from the Natural History Society with reference to co-operating during the winter session in providing papers, and it was thought advisable to arrange that the alternate fortnightly evenings should be devoted to the Natural History Society and this club, respectively, and that the meetings of both societies should be open to all the members of each. The committee now recommend that their successors should try this arrangement next session."

"The committee desire to record their thanks to Mr. Shakespeare Wood, of Rome, and Mr. Lewis G. Mills, LL.B., of Armagh, for coming from a distance to read papers before the society. The committee also desire to express their obligations to the Natural History Society for the continued use of the Museum, and for their manifest desire to co-operate with this society in the furtherance of their respective objects."

We congratulate this society on its success so far, and trust that its endeavours to keep up interest in archaeological subjects will be appreciated and supported.

NOTES OF WORKS.

The ground at the corner of Shore-street, Hollywood, which has heretofore been used as a market space, is about to be occupied by two shops, to be built for the proprietor, Mr. P. Burns, from the designs and under the

superintendence of Mr. T. Hevey, Belfast. The corner premises has been designed for the purposes of a large tavern, and has a beer-cellar, tap-room, bar-parlour, with a projecting bay window, and all the usual requirements of such an establishment. The building will be faced with perforated brick, cut stone being used in strings, sills, shafts, eorrels, &c. Quantities were supplied by Mr. Taafe, building surveyor, and the work will be executed by Mr. Nimock, builder, of Hollywood.

A new distillery is about to be built on a site adjoining the Ulster Railway, Belfast, for Messrs. Dunville and Co. The new building is to be of great extent, but as yet we have not received any particulars of cost. Mr. McKinnion, we believe, is the architect.

A large building has been commenced in Bedford-street for the Bedford-street Weaving Company, Belfast. The building will be faced with Scotch stone, and the elevations are of a pleasing character. The architect is Mr. T. Hamilton, of Glasgow and Belfast, and the builders are Messrs. McCreary and Morgan.

Extensive alterations and additions are being made to the commercial premises Nos. 2 and 3 Merrion-row, consequent upon the determination of the proprietor, Mr. Peter Walsh, to open the new Shelbourne House on such a vastly improved and comprehensive scale as will meet the demands of increasing trade in this rapidly advancing thoroughfare. The street frontage will extend 60 ft., the entire superstructure of which will present an ornamental façade, with enriched cornices, panelling, and rusticated quoins. The contract has been taken by Mr. Sam. H. Bolton, under the directions of Mr. C. Geoghegan, architect.

The new branch office of the Royal Bank in Upper Sackville-street will shortly be completed and ready for business. The entire premises have been suitably remodelled for the purposes of the bank. The upper portion is intended for the residence of the local manager. This is the third branch bank recently established by this highly prosperous company to meet the claims of business in their several localities. The works are being executed by Mr. Saml. Robinson, Westland-row, under the directions of the bank architect, Mr. C. Geoghegan, Great Brunswick-street.

The new church and refectory at the Catholic Institution for the Deaf and Dumb, Cabra, are fast approaching towards completion. The east wing of the main building will be covered in a week or two. These additions will extend the principal frontage to the length of 251 ft., and form an attractive feature facing the Navan road. The works are most creditable to the contractors, Messrs. Hammond. Mr. Charles Geoghegan is the architect.

VERY DURABLE CEMENT FOR IRON AND STONE.—M. Pollack, of Bantzen, Saxony, states that for a period of several years he has used as a cement to fasten stone to stone, or iron to iron, a paste made of pure oxide of lead, litharge and glycerine, in a concentrated state. This mixture hardens rapidly, is insoluble in acids (unless quite concentrated), and is not affected by heat. M. Pollack has used it to fasten the different portions of a flywheel with great success; while, when placed between stones and once hardens, it is easier to break the stone than the joint.

Mr. Serjeant Parry, in a recent action for libel, stated that if a man published of another that that other was not a gentleman—with intent to bring him into contempt—such publication was libellous. The learned serjeant is not in the habit of stating anything without having good grounds for it; we may, therefore, take the law to be as he has laid it down. Since then, a plaintiff recovered £500 damages from the proprietors of a periodical, in which, among other things, the plaintiff was said to be no gentleman. On the other hand, it is not actionable to call a man a "liar;" yet surely the epithet is intended to load the man with contempt! There is a class of "gentlemen" who are privileged rogues, and who laugh at the less lucky rogues whom prison walls inclose. It is hard that moralists may not safely proclaim such knaves to be no gentlemen. Surely to bring them into contempt is a duty.—*Athenæum*.

THE NEW THAMES TUNNEL.

THE new Thames Tunnel or Subway was begun on the 16th of last February (singularly enough, the forty-fifth anniversary of the day of commencing the old Thames Tunnel), and will be opened for public traffic in November next. Thus it will have taken only nine months to complete instead of twelve years—the period occupied in constructing Brunel's Tunnel—and its cost will be less than £16,000, as compared with about £450,000. Of course, there are most important differences in the works both as to size and method of construction. Brunel's is a vast elliptical tube of the most massive brickwork, including two side roadways, each about 14 feet wide. Mr. Barlow's new tunnel is simply a powerful circular iron tube, 7 ft. in diameter, taken deep under the river and in the London clay, which is of itself as impervious to water and as unlikely to move as the great blocks of Stonehenge.

A description of this shield and the way it advances will but convey to the general reader a good idea of the very simple method of construction of the tunnel. The shield, then, is for its great strength a light circular piece of mixed cast and wrought iron, weighing two tons and a half, and having an outer diameter of 7 ft. 3 in.

The way the tube of the tunnel—that is, the tube itself—is built is by means of three segments of a circle of cast iron, each of great strength, and weighing 4 cwt., with a centre key-piece at the top, weighing 1 cwt. Each segment or ring when bolted together is only 18 in. long, but no fewer than six of these rings are bolted on in every 24 hours, so the tunnel is advancing at the rate of 9 ft. a day. As the cap or shield is pushed on for a length of 18 in. it leaves within its tube or rim a space 1 in. greater all round than that occupied by its own tube on the outside. This, therefore, leaves ample room to fit in the segments of the tunnel tube easily. This is done very rapidly. The bottom segment is laid in its place, and the two side segments above it, and between these at the top the key-piece is slid in. Between the long horizontal flanges a layer of white pine is placed before they are screwed close up, and it is to be regretted that some such indestructible material as gutta-percha was not chosen for this work. The spaces between the circular flanges of each segment are regularly calked in with tow and cement. Still, the shield or cap is 1 in. wider all round than the diameter of the tunnel tube within it which comes afterwards to occupy it, leaving an opening of that space between the clay and the iron. This interstice, when the segment ring is fixed, is closed by pumping in blue lias cement, which as it quickly sets forms a ring of stone work, not only impervious to the water,—for that, indeed, the tube itself is,—but impervious to the action of water on the iron tube itself, which is a very important matter. It takes some time to explain all these details, but in practice they are all very quickly done. Thus the men excavate the ground in front of the shield, move forward the shield, and fill in another segment behind it every four hours; and, as the work is continued day and night in three relay gangs working eight hours each spell, it follows that the tube advances 9 ft. every 24 hours. So, though it has only been begun seven months, it is already completed to a length of 1,050 ft., without delay or accident of any kind. At the heading, or shield, where the tunnel is driven the atmosphere is very hot; but this naturally arises from seven men, with about three times that number of candles, working in a very confined space. It would be very much hotter but for the end of a tube which is taken along the tunnel to the shield, and along which, by means of a steam fan at the head of the shaft, a tolerable current of air is driven. When, however, the tunnel meets the shaft on the other side, and thorough ventilation can be got, the place will be as cool as a vault, and not affected either by hot or cold weather in the atmosphere above.

It is almost needless, after the description we have given of this circular tunnel, to state

that it is not intended for foot passenger traffic. It is meant for a tramway of 2 ft. 6 in. gauge, on which is to run a light iron omnibus of 10½ ft. long, 5 ft. 3 in. wide, and 5 ft. 11 in. high. This will accommodate 14 people with the most perfect ease. Ordinary lifts will take them down and up the shafts at either end, and at the end of the shaft the “bns” will be waiting. For the first hundred feet or so the omnibus will be pulled by a rope fixed to a stationary engine; after that it will descend by its own velocity down the incline and up the incline on the other side to the foot of the shaft. The whole transit, including time for descent and ascent, is calculated not to exceed three minutes, which with a working day of sixteen hours, and allowing for the omnibus not always being full, would give about 5,000 to 6,000 passengers a day, who, at the rate of 1d. a-head, would give a net revenue to the company such as ought to pay an immense dividend on the small capital of the company on passengers alone, exclusive of the charge upon parcels. There is, however, not the slightest reason why, if the traffic increases, two omnibuses should not be run together, instead of one; for as long as they are together, and nothing but themselves in the tunnel, collision becomes a physical impossibility.

As far as the work has yet gone no engineering difficulties worthy of the name have presented themselves, though there is no doubt that a great deal of this freedom of obstruction has been due to the originality and perfect carrying out of the whole design. Deep in the London clay neither slip, subsidence, nor water was to be looked for, and none has occurred. In sinking the shaft at Tower-hill the soil was for 15 ft. or 16 ft. entirely through soft, new-made ground, and in this soil a rotten leather bag was found, containing about 300 silver twopenny, fourpenny, and sixpenny pieces of the reigns of Henry III. and Alexander VII. of Scotland. Just above where these coins were found, a broad and well-paved road was come upon, which was evidently, centuries ago, one of the main routes from Thames-street to the Tower Keep. Much below this road the remains of bones of many animals, such as swine, oxen, and deer, were found, but nothing more. In the excavations for the tunnel some shark's teeth were found in the soil, and a great many shells, all the latter, with one or two exceptions, being those of salt-water shell fish. Occasionally, in going through the clay, what are called clay stones were come upon, and one especially last week of most unusual size, hardness, and thickness. The traces of fossils that have been met with have been few and unimportant, but even these have all borne traces of having once been salt-water crustacea. In a few weeks more the public will be able to judge for themselves as to the use and convenience of the tunnel.

OUR MONETARY SYSTEM.*

On page 210 of the *Athenæum* Mr. Hall has the following:—“The movement for a decimal coinage has hung fire of late. Twenty years ago Government made an attempt in that direction by issuing the florin, value twenty-four pence, it being the decimal of a sovereign, or pound sterling; but it results in a dead lock—we cannot decimate the florin.”

During the last twenty-five years I have given much attention to this subject, and the result is a conviction in my mind that the movement of the Government in that direction was the correct one; and I should regret any serious attempt to divert them from it by the introduction of another scheme. The only misfortune is that their movement has been somewhat tedious, and apparently, as Mr. Hall observes, “results in a dead lock,”—but certainly not because it is “impossible to decimate the florin.” I will endeavour to make it plain. For instance, let the Master of the Mint take two shillings' worth of copper, the value of our florin, and have it coined into one hundred new farthings, instead of into

ninety-six, the present number, and ten of these new farthings would be the tenth of a florin; a new coin of this value might be issued simultaneously with the proposed farthing, and might be called a *deciflorin*, which would make the scheme complete.

The florin is indeed a most convenient coin, not only on account of its being the tenth of a pound sterling, but because it can be *halved* and *quartered* without a remainder. The shilling being the half florin, and the sixpence the quarter florin.

As an integer in account, the florin is perfect, and all coins of lesser value should be made to accord with it; because any amount stated in florins resolves itself into pounds and florins respectively without changing a figure. For example, 123 florins, by pointing off the unit figure (12.3), become £12 3fl.; by adding a figure, say 4, the amount becomes 1,234 deciflorins, and by adding another, say 5, it becomes 12,345 new farthings, which properly pointed off becomes (12.34.5) £12 3fl. 4de. 5f. and *vice versa*.

Should the name “deciflorin,” for the proposed new coin of ten farthings value, be objected to, it might with equal propriety be called a “*cross*,” if made with the letter X distinctly marked upon it, with the words ten farthings or one cross, the tenth of one florin.

The table for money of account will therefore stand as under:—

10 farthings	...	...	1 cross.
10 crosses	...	...	1 florin.
10 florins	...	...	1 pound.

And should Mr. Hall's system of Exchequer notes be adopted by the Government, the table might be further extended by adding the words 10 pounds 1 note, and they would all arrange themselves in decimal order.

There is no reason why this system should not be at once introduced, as it could be done without the least inconvenience to the public, or loss to the revenue; and it might be adopted with even all our present coins in use. I will endeavour to illustrate this point in the plainest possible way. Premising that new coins, the deciflorin, or cross, and the new farthings, are in circulation, and obtainable as follows: for every sixpence, or 6 pennies, 25 new farthings shall be given; for every shilling, or 12 pennies, 50; for every florin, or 24 pennies, 100; and for every sovereign, or 240 pennies, 1000. New pennies and new halfpennies, however, to replace the old ones, should be issued as speedily as possible, in order to perfect the system—such auxiliaries, for business purposes, being almost indispensable.

As in the coining of the new farthing so let it be with the new penny. Let the Master of the Mint take one pound's worth of copper, and have it coined into 250 new pennies, instead of 240, the present number. The new penny would thus be the exact value of four new farthings, and the new halfpenny the like value of two. This point should be clearly understood, and the public, I am sure, would be willing enough to aid the Government in its introduction; for who would not be willing to obtain 250 new pennies for 240 old ones? or 25 new farthings for 24 old ones, as the case might be?

This system, in my opinion, would be as perfect and convenient as the common decimal notation, which cannot by any human ingenuity be improved. H. A. VILES.

WANT OF WATER IN NEWRY.—In calling attention to the scanty supply of water in this town, the local *Telegraph* asks, “What shall we do for water? The town commissioners say they are doing their best to supply us. If they are at present at their best, we should like to know what would be their worst? Abyssinian pumps were to have been provided. Surely if the army in Abyssinia had to wait for water as long as we have had to wait for their pumps, Theodore would still have been enjoying his favourite pastime of killing and slaying his unfortunate subjects. The water-works are mere heaps of mud baking under the sun; the pumps and wells are running dry. If any one dies as the result, we will suggest to the surviving relatives to get Mr. John Rea to town, and at the coroner's inquest have the whole body of commissioners indicted for manslaughter through neglect of duty.”

* From the *Athenæum*.

CORRESPONDENCE.

[It is to be distinctly understood that although we give place to letters of correspondents, we do not subscribe editorially to the opinions or statements set forth in same.]

THE ROUND TOWERS.

TO THE EDITOR OF THE IRISH BUILDER.

SIR,—Mr. Palmer has done more to mystify and mislead the public than any other man who has written on this subject. Perhaps you will grant me space to make a few observations on the two last letters published by him. The greater portion of the first one merely gives evidence against himself, for he adduces nine arguments, the first six of which are entirely in favour of the ecclesiastical origin and uses of the Round Towers. I will therefore proceed to analyse the seventh argument. He says—"The four windows or doors at the top immediately under the conical roof . . . served for the purpose of admitting the crier to announce from each the hour of prayer, so that the people might assemble at the appointed hour for Divine worship." How, I ask, could a man make himself seen through an aperture in a wall 5 ft. thick, 1 ft. wide, and never less than 3 ft. high, much less heard when the above-mentioned aperture was 100 ft. from the ground? How does this latest theory agree with a letter written by Mr. Palmer in December last, in which he says that the fires of Baal were continually kept burning in these towers, and that the windows were placed in the towers in order that the light might be seen from a great distance. In the 8th and 9th points he compares them to Turkish minarets, and asserts that our Round Towers were copied from them, whilst if he had the slightest knowledge of history or architecture he would know that there was no Turkish style (unless we include the Byzantine) before the seventh century, and, therefore, that there were no minarets, because they are the distinguishing characteristics of the Turkish style of architecture; and even if there were, I can see no possible resemblance between an Eastern minaret and an Irish Round Tower; on the contrary, I cannot see how any one can be so blind as not immediately to perceive that they bear no possible resemblance to one another. Mr. Palmer also cites Dr. Adam Clark as an authority, but does not give the title of the book from which he quotes. In his last letter he states that, prior to the introduction of Christianity, all buildings were round in shape, or nearly so; perhaps Mr. Palmer will have the kindness to give the names and localities in which those circular pre-Christian remains are to be found. Mr. Palmer makes some ridiculous remarks about some portion of them being built of red sandstone, and endeavours to show that because the Arabian desert happens to be on a sandstone formation, and some Irish Round Towers are built of red sandstone, that therefore there is a close connection between them and the East. This argument needs no answer. He then cites the case of an old windmill at Crumlin, and elevates it to the dignity of a Round Tower, because there happen to be a few red bricks used over the doorway. He then alludes to buildings at Tara, being probably ignorant of the fact that none such exist in the locality. As to the use of mortar at Pompeii, where it was used several centuries B.C., I think that it does not prove it was used in Ireland, for at that period the locality and almost the very existence of Erin was unknown to the Romans.

Will Mr. Palmer explain how it is that we find the straight or triangular arch, as it is called (like an inverted V), which is almost invariably found in the Round Towers, in Saxon churches, the date of the erection of which is between the seventh and tenth centuries, as in Barnack Church, Sumping Church, and St. Michael's, Oxford? also the pilaster strip, a distinguishing feature in Saxon work, round the doorways of the towers at Donaghmore, Monasterboice, and Roscrea? How can he account for an arch in three orders, with chevron and columns, with grotesque capitals, at Kildare, and the door of Timahoe Round Tower, with a zig-zag moulding on the soffit and a pellet enrichment?—exclusive characteristics of the Norman style of architecture which flourished in England from the tenth to the twelfth centuries. Dr. Petrie, in his essay, does not, I think, attach sufficient importance to this similarity in the detail of the Round Towers and the Saxon Churches of England, the dates of which have been ascertained.

I shall now quote some remarks made on this interesting subject by a gentleman,† who, by his antiquarian and historical researches, has done much to popularize the history of our country:—

"Respecting the origin of the Round Towers, a throng of clouds and chimeras has been diffused through the public mind by the industry of men who have shown nothing of the knowledge or the reasoning

powers that would at all qualify them for the investigation of the origin of those curious antiquities. All that has been produced within the last few years by these parties in opposition to Dr. Petrie's conclusions, is so hairbrained and absurd, that it would not be worth noticing but for its mischievous tendency to obscure and weaken opinions which had merely begun to acquire strength and permanency, and to check or confuse information which had not yet been sufficiently spread to present a really impregnable barrier to garrulous whim, plausible insanity, or coxcomb vanity. Nothing has been advanced that receives the least support from history or popular tradition; from the comparison of ancient remains, customs, or superstitions; from philology or skieology; from astrology, astronomy, demonology, or *busthoonology*; from Buddh or Zardast; from the Hindees, Chaldees, Druids, or Phoenecians."

In conclusion, I do not in this and my former letters make any unfounded assertions from myself; but have endeavoured to answer Mr. Caleb Palmer, and in lieu of some one better qualified coming forward, to vindicate the conclusions arrived at by the late Dr. Petrie. People may attempt to overthrow his arguments, but it is by patient study and examination of the towers and everything bearing on them and a profound knowledge of architecture and archaeology, that the truth is to be arrived at, and not by garbled quotations and ridiculous assertions having no bearing on the subject. Fancy a man writing about the Round Towers and confounding them with windmills! Surely Mr. Palmer will need to learn a great deal of archaeology before he again ventures to give an opinion on the origin and uses of the Round Towers of Ireland.

JOHN L. ROBINSON, Archt., R.I.A.I.

LAND TENURE.

TO THE EDITOR OF THE IRISH BUILDER.

SIR,—I believe this letter contains practical and equitable suggestions for the satisfactory settlement of our land question, not noticed by any other writer. I shall thank you to give it a place, on these grounds, in your paper, which will bring it under the notice of many thoughtful minds:—

Some means must be devised for giving the industrious and honest tenant such a right of tenure in his farm as may be consistent with the full demands of justice to both himself and the landlord, such as will prove a constant inducement to him to exert himself to the utmost to improve the condition of his farm, so as to make it yield the largest possible amount of produce. To effect this he must expend labour and capital on it, and this he cannot be expected to do unless the tenure secured to him by custom and by law satisfies him that he and his family will derive the full benefit of his labours. The question then is, can this full confidence be given to the tenant without infringement upon the just rights of the landlord? To me it seems that this is quite possible of accomplishment.

One of the difficulties in the way of an equitable arrangement of this knotty question is what seems to me an erroneous idea about the rights of property. What do we mean by the rights of property? I hold that there is no right to property of any kind that is inconsistent with the public good. None of us have that absolute right to it which would authorise us to use it for purposes injurious to the community. If this be true with regard to all kinds of property, it has especial force with regard to property in land, which has ever been held in every country in subjection to the necessities of the whole population.

If this principle be admitted, it follows that the owner of property in land is morally bound to give the cultivator of it such a tenure of his holding as will not only induce him to make the most profitable use of it for his own benefit, but also for the benefit of the whole community; that he should be stimulated continually to improve it, and increase its productiveness, and be fully assured at the same time that he and his children shall enjoy the full benefit of his labours upon it. Justice demands this, and it is generally conceded that the tenant has a right to all the increased value which by his labour he gives to his farm. The chief difficulty in the case seems to be—for its equity is conceded—how to effect this equitable arrangement, and this difficulty is caused by a latent feeling that all—that is, very pennyworth of the value he puts into it—is too much to give him. Get rid of this feeling, this latent, this dishonest feeling that the landlord has a right to some portion of the tenant's industry in perpetuity. Let this point be settled by law as well as by public opinion, and I can see no subsequent difficulty in making an equitable arrangement in all future time between the parties. Let us take a case. A landlord lets a farm, say of fifty acres, to a tenant at 20s. an acre, its then full market value. The

tenant expends labour and capital in various ways upon the farm, according to the best of his judgment, being only bound in one condition to his landlord, that being to pay him regularly the stipulated rent, or in default thereof to give up peaceable possession of his holding; and he should also be restricted as to subletting. No lease for any term of years is necessary; legal possession given is all that need be required. What more has the landowner a right in equity to demand than the punctual payment of the rent agreed upon? He never expends thought, labour, or capital on the farm to make it more valuable—I am supposing that to be all done by the tenant. In the course of years—say ten or twenty years—this farm has been made so fertile by good cultivation that it is now worth forty shillings an acre. The owner of the land desires to re-possess himself of it; but law and equity say to him, you must first pay your tenant, in cash down, the full value of his improvements. These improvements are of the money value of the additional twenty shillings an acre, which the new tenant you purpose to deal with will contract to pay you. Call in an actuary, he will tell you the money value of the improvements made by your present tenant, hand him that sum in hard cash, and then resume your land as soon as you please. Does not any sensible man see that such an agreement as this between landlord and tenant would be tantamount to a perpetual tenure? For where is the landowner to be found who would be so insane as to pay his improving tenant the full value of his improvements, dispossess him of his farm, and place another man, without a shilling of advantage to himself, in possession. The idea is preposterous. Thus we see that, without any injustice to the landlord, the tenant is secured in all his rights, and a perpetual tenure of his farm given to him so long as he acts the part of an honest and industrious man.

What! it may be said, will you give the landlord no right of increasing his rent when he pleases, or even at the expiration of a lease, if there be a lease? I say, never at the expense of the tenant; the rights of industry reject that idea. But in the progress of civilization, circumstances, over which the landowner and the tenant farmer exercise little or no influence, are constantly occurring that tend to increase the value of land.

In order to deal equitably with both these parties, under these circumstances, let an inquiry be instituted by a proper court, consisting of landowners and tenant farmers in equal numbers, to be denominated a court of arbitration and conciliation.—One such court in each province should be instituted, say every twenty years, to ascertain the amount of this increased value which should be divided equitably between them. The amount awarded to the landlord the tenant should pay over in cash to him, or pay its value in an equivalent increase of rent. Thus full justice would be done in all future time to both. This court of conciliation which I suggest is no new and untried scheme; it has been acted on in a district round Nottingham for several years, and with the most beautiful and un-failing success—a scheme that has effectually succeeded in calming down the fiercest passions, centuries in existence, among a manufacturing population now numbering over one hundred thousand persons, could not fail of producing like blessed results in agricultural Ireland, if the same single-minded determination to do right animated our people; and why should it not in an equally noble cause? Judge Longfield, in an opening address before our Dublin Statistical Society, on the 26th November, 1864, expressed it as his opinion that if a perpetual tenure of land at a fixed rent was secured by legal enactment, the new landlords who would, he thinks, be created by that enactment would meet the law by a demand of rent far beyond the value of the land; that they would get what they could out of the tenant, and hold the balance over him in terrorism of constant ejectment. That might be so in some cases; though under the special plan which I propose I do not imagine such folly would often be resorted to. But supposing such madness to actuate our landowners, either large or small, it must be met by the most decided counteraction. Some Gladstone would arise to deal with such grovelling selfishness, and an honest House of Commons, true representatives of the people, would give him their ready and earnest support. It would be sufficient to point out to the foolish usurpers of an unjust power the conduct pursued in Prussia a few years ago under somewhat similar circumstances—that is when the landlord usurped all power—by the ministers Stein and Hardenburg (these, I think, were the names of those wise statesmen), to make our fools pause in their career of folly, to say nothing to them of their personal danger from a continued warfare with an impoverished community, made desperate by tyranny or injustice. There are other motives than selfishness actuating human conduct—benevolence and kindly feeling are strong counteracting forces to a mere brutal selfishness. We see them operate all around us in many ways among the poor and the rich. Where they are latent, for they exist in every man, let us encourage their active exercise by having

* "Principles of Gothic Ecclesiastical Architecture"—Bloxham.

† Rev. C. P. Meehan, M.R.I.A.

faith in their existence. If there were not more good than evil amongst us, society would fall to pieces. Let us, I say, have faith in man, while we at the same time adopt all the sensible and prudent means within our power to guard society against the ignorance and vice which prevail, by such wise laws and customs as may be fitted to effect our object.

As Parliament is soon to take measures under its consideration for the settlement of the future tenure of land in Ireland, now is the time for those who have any ideas on the subject, and any influence among their fellow-men, to speak out. I offer the foregoing suggestions to my countrymen for their consideration; and I pray God to put it into the hearts of our statesmen and of our representatives in the House of Commons, of our landowners of all ranks and classes, and of all our tenant farmers, large and small, to enter on this great subject with an honest desire to do all that in them lies for the peaceful, just, and happy settlement of a question which has long kept the different classes of our countrymen in a state of warfare, and has been the bane of the happiness and contentment of our people.

JAMES HAUGHTON.

ANCIENT TOMB-STONES.*

In the form of a small quarto we have on our table the substance of a paper read before the Belfast Naturalists' Field Club by Mr. Wm. Hugh Patterson, on the 18th of March. The author's attention having been, during the past summer, directed to several ancient-looking tombstones in the graveyard surrounding the ruined abbey church of Movilla, near Newtownards, he undertook the task of sketching and describing them; the result is now before the public.

At p. 3 of this well-gotten up brochure, our author, in the spirit of a sincere archaeologist, informs us that—

"My object in bringing forward the present short notice is for the purpose of placing on record, for criticism or reference hereafter, some description of the ancient tombstones in this locality, and to direct attention to the study of a class of monuments which appears to me to have been too much neglected in Ireland. No doubt, in many of our old parish burial-grounds, and especially in the neighbourhood of our ruined abbeys, such monuments exist in a more or less perfect state; and it is to be regretted that, while the sculptured stones of Scotland and England, and even of the Isle of Man, have been the subjects of ample investigation and learned criticism, the Irish mediæval tombstones have received little or no attention. So far as I know, the published notices of these monumental slabs have been very few and meagre: it would be most interesting if the examples still existing were figured and described by persons residing in the different localities where such are accessible. If this were done, considerable light would be thrown upon the state of art in this period of our ecclesiastical history; and from the variety and beauty of the designs, useful hints might be taken by the constructors of modern Christian monuments."

MISCELLANEOUS.

ANOTHER STRIKE ON THE DUNDALK AND GREENORE RAILWAY.—Undeterred by the failure of the strike of the labourers, which took place some few weeks ago on this line, the masons and bricklayers have now struck for an increase of wages and a reduction of the hours of labour. The wages allowed to the masons and bricklayers have been at the rate of 24s. per week, and they now seek an increase to 26s. per week, and, in addition, that they should have a half holiday on Saturday, from two p.m. Messrs. Connor and Olley met the demands with a firm refusal, and the men at once quit work. By this move a number of labourers have been thrown idle, but the levelling and ballasting of the line are being still proceeded with. Messrs. Smith, Grendon, and Co., of Drogheda, have undertaken the construction of the large railway bridge across the Dundalk river at a cost of £10,000.

THE DUKE OF YORK'S COLUMN.—For some time (says the *Daily News*) one of the ornaments of Trafalgar-square has been undergoing a reparative operation which might have been undertaken with greater propriety during the season. The statue of Napier has been cleaned as bright as a new halfpenny, and it seems as though the famous man had gone out of mourning, and put on a shining bronze suit. But the King over the way, and Nelson upon his masthead, and Sir Edwin's Lions, are still grimy niggitudes smoked out of countenance, and looking still blacker

from the contrast of their sootiness with the gloss of the renovated effigy. We may be hard to please, yet it seems to us that the job has been overdone with reference to the warrior. He has the hue and complexion of a pretentious candlestick carefully scoured and polished. No doubt, however, the climate will soon enough reduce the colour to mellow tints. Meanwhile, has washing day for these London celebrities come at last? It has either been postponed too long, or should be deferred until next spring. The autumnal and November fogs will just grease the metal nicely for catching the smut from the household fires of winter. When will the noble monument to the Duke at Hyde Park be taken in hand? We do not refer to the startling warrior who defies the world from a mound within the gates, but to that glorious figure in the night-gown seated on a horse which is said kindly by the French to have avenged Waterloo. There is a pot boiled every day under this work of art, to judge by the column of smoke which gracefully curl around the poor Duke and horse—somebody lodging or living immediately under him; and this is done in full view of the family bearing his name, who are obliged to witness the nation's touching memorial treated as though it were bung bacon.

A MONSTER GAS WORK.—Barking, on the Thames, already celebrated by its "northern outfall," and its patent sewage factory, is to become still more famous by the presence of the largest gas work in the world. As we mentioned some months ago, the Chartered Gas Works are about to remove from their present position, in the heart of the metropolis, to Barking. The new works are on a scale of extraordinary magnitude. They cover 150 acres of ground. The four retort-houses are each 360 feet in length. There will be 1,080 retorts, capable of reducing 1,000 tons of coal daily, and of producing 10,000,000 cubic feet of gas. There will be four gasholders, each capable of holding 1,000,000 cubic feet. There will be eleven and a-half miles of main from Barking to Westminster, and eight and a-quarter miles of this length the main will be of no less than four feet diameter.

AMERICAN STATE PRISONS.—The 1869 report of that useful body, the New York Prison Association, states that amongst the punishments still employed in their state prisons, are the iron cap, the ball and chain, protracted shower bathings, the iron crucifix or yoke, and the buck or truss. The shower-bath almost drowns the shivering, panting wretch into submission. The crucifix is a flat bar of iron, weighing from 35lbs. to 50lbs., attached to the neck and wrists by three iron rings, which can be screwed to any tightness. The "buck" punishments consist in tying the wrists and legs together, and then trussing up the prisoner for hours by means of a stout stick passing between the legs and arms, and thus suspending the prisoner from two chairs for hours in a doubled up position. Criminals should be both punished and reformed; but surely not, in these days, by such methods. Well may the New York Prison Association plead as to these tortures—"Let them be banished by law in *secula seculorum*."

The War Office has decided upon reducing the amount of stationery now issued at the public expense to staff and department offices. Each clerk is to be supplied with four dozen pens a year and four lead pencils, but no more, and the issue of needles, pins, knives, scissors, rulers, and "Imperial Calendars" is to be entirely discontinued. It is further enjoined that the strictest economy should be exercised with regard to writing paper, and letters on the public service are to be written on half-sheets.—*Broad Arrow*.

THE POPE AND THE ARCHITECT'S SON.—The *Gazette de Cologne* is responsible for the following anecdote. It seems that the Basilica of St. Peter's, in anticipation of the Ecumenical Council, is undergoing some repairs. One morning the architect's son brought to the Pope some of the necessary plans and drawings connected with these repairs. His Holiness was highly delighted with them, and taking the boy by the hand, led him to a drawer in which were lying some gold pieces, telling him to take as many of these as his hand would hold, in honour of the beautiful workmanship of his father. "Please, Holy Father," said the unabashed boy, "let me have what your hand will hold—that is so much larger!" The Pope, adds the *Gazette*, good naturedly did as he was desired.

THE RECENT SHEEP SHOW.—A number of photographs of the prize animals in the several sections of the sheep show, recently held on the premises of the Royal Dublin Society, have been produced by Mr. Edmund G. Ganly, of 43, Grafton-street. They are all excellent in pose, and have been taken with much care and judgment. They are large-sized, and we have been informed that they have been enlarged by the solar process and painted in oils. The use of photography for the purposes of correct representation of animals was never better illustrated than in these pictures.

CIVIL SERVICE LITERARY SOCIETY.—At a general meeting of the society, the following members were elected to the offices and the committee for 1869-70:—Auditor—Mr. J. Carille, A.B. Joint Secretaries—Mr. T. F. Taylor, Mr. Bernard Connor. Treasurer—Mr. John Kelly. Committee—Mr. J. G. Alcorn; Mr. J. R. O'Flanagan, M.R.I.A.; Mr. C. H. Brien, F.R.G.S.I., A.R.I.A.I.; Mr. W. Peake; Mr. H. O'Hea, A.B.; Mr. W. W. Hartford. The society's prizes for the past session have been thus awarded:—For public speaking: first prize, Mr. J. G. Alcorn; second prize, Mr. Bernard Connor. For the best essay: first prize, Mr. T. F. Taylor; second prize (Mr. C. H. Brien, Mr. J. G. Alcorn)—equal.

NATIONAL LIFEBOAT INSTITUTION.—The past four or five days have been prolific of shipwrecks, principally on the English coast; and this addition to the "Wreck Register" of the year recalls to mind the efforts of the National Lifeboat Institution. We learn from a perusal of the "Wreck Register and Chart for 1868" that the number of wreck casualties and collisions from all causes on the coasts of the United Kingdom, and in the surrounding seas, reported in 1868 is 1,747. This is 343 less than the number reported in 1867, and 118 less than the number reported in 1866. During the year 1868, and the first eight months of 1869, 938 lives (besides 34 vessels) were saved by the lifeboats of the National Institution alone, and 558 by shore boats and other means, for which it granted rewards. A sum of £3,968 was expended by the institution in the same period in rewards for saving life; and £33,000 on its various establishments round the coasts of the British Isles. Nearly one thousand valuable lives were thus saved, and an expenditure took place of about £37,000 in rewards for saving life and adopting precautionary measures to the same end. It is unnecessary to say more in aid of the claims of the institution to public support.

The new Royal Docks at Cork Harbour will be inaugurated on the 28th inst.

THE FIRST EDITION OF SHAKESPEARE.—In the first portion of the library of the late Mr. C. T. Swanston, Q.C., sold at Puttick and Simpson's, in Leicester-square, London, there was a fine copy of the rare first edition of Shakespeare, printed in 1623. It wanted two leaves, and had some other trifling defects. After a smart competition it realized the large price of £338. The purchaser was Mr. Quaritch, of Piccadilly.

It has been said that a little carboric acid dissolved in the water which is used to moisten a whetstone or a grindstone, will greatly increase the friction, and thus promote the action of the stone upon the steel instrument. If this be tried, and there be no unforeseen drawback, carboric acid will prove invaluable to all who have to sharpen tools or grind metallic surfaces.

Out of 400 and odd architects who applied for instructions in a competition for prizes in connection with designs for Bradford New Town Hall, thirty-one have actually entered the lists, two of them sending in two distinct sets of plans. Several of the designs are of an ambitious character, pointing to considerably more than the cost (£40,000) fixed by the town council for the whole pile.

A GREAT TURKISH BRIDGE.—A French concern, the Compagnie de Chantiers de la Seine, is understood to have been charged by the Turkish Government with a colossal work—a great girder bridge of boats to unite Stamboul with the suburb of Galata. The length of the bridge will, it is affirmed, be no less than 6,000 feet.

GOLDSMITH'S WORK.—The progress of fine art manufacture in this branch of trade is strikingly exemplified in a little work published by J. W. Benson, of 25, Old Bond Street, and of the City Steam Factory, 58 and 60, Ludgate Hill. It is enriched and embellished with designs (by Italian, French, and English artists) of Brooches, Bracelets, Earrings, and other articles, suitable for personal wear, or Wedding, Birthday, or other presents, with their prices. Mr. Benson (who holds the appointment to H.R.H. the Prince of Wales) has also published a very interesting pamphlet on the Rise and Progress of Watch and Clock-making. These pamphlets are sent post free for two stamps each, and they cannot be too strongly recommended to those contemplating a purchase, especially to residents in the country or abroad, who are thus enabled to select any article they may require, and have it forwarded with perfect safety.

All Communications respecting the IRISH BUILDER, should be addressed to MR. PETER ROE, 42, Mabbot-street, to whom all payments for Subscriptions and Advertisements must be made.

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* A Notice of Some Ancient Tomb-Stones at Movilla, Co. Down." By William Hugh Patterson. Belfast: W. & G. Baird.

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Land Surveying.



N this era of progress, every thing is designed to be in keeping with the requirements of the age; steam, electricity, and science are made to subserve the demands of progress, and connected with them there is a subject the cultivation of which they require for their effectual advancement. This subject in its

entirety has been limited very much to the learned, as it requires much previous education to qualify the mind for its useful reception. Civil engineers and official surveyors must necessarily know something of it. Our lands and houses, our gardens and cosey spots, are bought and sold by its admeasurements. Yet,—though so important that an error in its results compels a tenant perpetually to pay more than his right for his holding, or the landlord to receive annually less than he should receive, and all our great *broad* transactions are subject to its sway—yet strange, a subject which may serve or injure in its results, three-fourths of the entire community has been left comparatively neglected, eminent mathematicians devoting their talents to the elucidation of other mathematical sciences. Land-surveying as a profession is often taken up by a few ignorant country practitioners, who attempt determining the three elements of a triangle and hence its area, men whose great qualification is, that they possess a chain, but who know not the use of the simplest angular instrument, and are often incapable of taking the dimensions of a tract of ground, never having as much as read either old “Gibson” or “Crocker,” and gentlemen, to their hurt, are rather fond of employing to survey property, those who thus set themselves up, but who seldom have more to recommend them than their cheapness, and consequent incompetency.

In Rome surveying was considered one of the liberal arts, and the measurement of land was intrusted only to certain responsible public officers. In these countries such discrimination is not observed. To be a land surveyor a man should be qualified in arithmetic, geometry, algebra, mensuration, and the facile use of mathematical instruments, and such practical skill as to be beyond the possibility of gross error. But how can this be accomplished without a proper instruction book? There are very many books on the subject; a few are too large and costly, many too meagre, small and futile; some teach almost nothing on land surveying, some teach a little; one or two are tolerable, but nearly all leave the subject far from being exhausted. We consider that a gentleman treating in a masterly manner such an important subject, and remedying these defects, deserves well of the community. “A Treatise on Land Surveying”* has appeared, which purports “bringing before the reader the best methods

for practice in the art of land surveying, and the most convenient formula for computations in working out the required results for statistical, estate, colonial, and engineering purposes in the field and in the office, so that the art may be skilfully practised in the designing and making of really good surveys.

The work contains several woodcut and copperplate illustrations, designed to assist the reader in fully comprehending the more abstruse parts of the subject. Few books have laid down more rules to meet the ordinary difficulties and obstructions of an extensive survey, which to surmount would seriously puzzle inexperienced surveyors. There is, however, a large measure of practical and useful dissertation, and but very few practical question examples given; so that the student, to read the book profitably, must first have learned geometry, algebra, mensuration, plain and spherical trigonometry, and the use of logarithms, though in some cases he works by sines and cosines without logs. (see p. 14). The author presupposes such qualification in his student, and then teaches land surveying satisfactorily, the book being scarcely suited for elementary information in ordinary practical schools.

Irish, or “plantation” measure is barely noticed in the work, though in most parts of Ireland no other measure is customary or agreeable to the landholders. We shall lay before the reader a few short extracts from this very excellent “Treatise.” At p. 1 he says, “The survey may be made to furnish data for a map or plan only, or for ascertaining the area and laying down an accurate map.” “When the district is very extensive, the area on the horizontal plane would not be strictly correct, and should be computed as for a spherical surface at a given distance from the centre of the earth, to which the vertical lines will correctly refer the position of the detail.” (p. 2) “On the skilful use of the field instruments and the geometrical construction adopted for the survey, will mainly depend its excellence; an unskilful use of the instruments, or ill-conditioned geometrical construction, will render the survey inferior,” while “on the skilful use of the office instruments and the accurate delineation of the plotted detail (and careful field work) will depend the accuracy of the office work.” Thus Mr. Smith at the outset shows that skill and correct instruments are absolutely necessary, and he throughout his work exhibits how both may be obtained and judged of. He recommends the use of two chains—one of 100 ft. long for engineering purposes, and one of 66 ft. long for statistical use,—and describes the steel tape chain of the Continent, and some others. Mr. Smith’s method of determining the standard length of the chain is very important and *appropos*, and his chapter of remarks on the chain and formula deeply interesting and highly instructive. After describing the means of conducting the measuring of straight lines to the level in an undulating district, and fixing on what part is to be surveyed, the author says:—

“For the purpose of ascertaining the position of internal detail, the great triangles, which form the primary triangulation, should be subdivided by lines referred to their sides or to one another, so as to preserve in the subdivision, or secondary triangulation for detail, the features of well-conditioned triangles. The *split* line is an important line in this subdivision. This line should have

one end in an angular point of the triangle, and the other in the opposite side, which it should intersect as near as may be at right angles.”

Referring to the field book, he says:—

“The example field books for a map and for areas, and the skeleton diagram of lines, are given because the author acceded to the request of the Professors of Civil Engineering in the Queen’s Colleges in Ireland to allow a copy of the field book of the survey to be lithographed for the use of the engineering students of these colleges.”

When Mr. Smith differs from other authors of repute, his modesty is very apparent. He simply says of the method proposed by Mr. Baker and published by Mr. Weale for determining inaccessible distances, “The principle is correct, but the application of it is very faulty.” He adduces various ways of ascertaining inaccessible distances, which are ingenious, a few of them clever, and all perfectly practicable. In chap. iii. he treats most lucidly and accurately the subject of surveying with the chain and angular instruments. On page 65 he writes:—

“In order to judge the cause of error in the readings or observations, it is desirable to place on the ‘field book of angles’ a statement of the state of the weather and the time of observation, and also a brief description of the form and colour of the observed object. Objects of considerable lateral dimensions, such as towers, steeples, &c., when under a strong side light are liable to be inaccurately observed, the part under strong light appearing greater, and the part in the shade less, than when the whole is under a uniform light.” “The gaseous constitution of the atmosphere renders it subject to local variations of density, due to the development of local heat, which rarefies the part heated; so that the path of a ray near the earth’s surface, where local heat is very irregular, may be subject to many irregular disturbing causes, which render corrections for refraction unreliable. Hence the results obtained by computation from the vertical angles must be regarded as approximations only.”

In page 83 the author freely applies himself to a difficulty in measuring a base line where, from the locality, direct measurement of distance is almost impossible, and says:—

“Distance may be found by the measurement of quantity. The locality may be a lagoon, the means for making the measurement may be a water-tight steel tube, of small uniform bore and of the full length of the base line. This tube may be enclosed in a uniform gutta percha coating surrounded by light material, so as, when filled with water, to float it at all parts at the water surface of the lagoon or lake. Through this tube, at the time of fitting and soldering the parts to one another, a uniform steel wire of the full length should be passed. The tube may be passed across the lagoon by a boat’s crew, from one end of the base line to the other, to the vicinity of the trig. points. The tube will be visible at the surface, and so its position in the straight line may be verified by a trace of the *base line* with the theodolite. When properly extended and adjusted in the line, the ends of the tube and the internal wire should be attached to apparatus for keeping the tube and wire so extended, and for conveying water into the tube at one end and discharging it at the other, so as to expel the air and completely fill the tube with water. This may be perhaps more conveniently done by holding the forward end of the tube a few feet under water in extending it across the lagoon or lake. The temperature of the water in the tube and also of the iron wire should be observed at the ends and known intermediate points, at which extreme and intermediate points suitable valve appliances should be inserted, for making a gauging of

* “A Treatise on Land Surveying in Theory and Practice, By John A. Smith, C.E. With numerous Illustrations.” London: Longmans, Green, & Co. 1869.

the contents of the whole length at one or more operations. The water contents of the tube may be drawn off, and its weight or measure verified by taking the temperature and a direct gauging. The enclosed wire should be withdrawn in suitable sections, and, after being dried, it should be weighed and temperature taken. After the wire shall be withdrawn the tube should be refilled with water, and the observations for temperature made as before. It may then be discharged, and the contents verified by gauging, &c. These measurements should be repeated several times before and after the withdrawal of the wire, and a mean taken of the series or sets of measurements, for the correct gauging or contents of each. The difference in the gaugings will show the quantity of steel wire displacement. If the displacement at a known temperature for equal pieces of the steel wire, of an accurately ascertained length, be measured, sufficient data will be obtained to compute the distance, the law of expansion of water by increase of temperature being known. This will be checked by taking the quantity in terms of the ascertained weight, thus:—

Let W be the weight of the displaced water, discharged so as not to suffer loss by evaporation, and let W' be the weight of the displacement for a length of wire (say) $20\ l$. Hence weight of displacement for l , the accurately ascertained length, will be $\frac{W'}{20}$. From these data we have—

$$L = \frac{W}{W'} \times 20\ l,$$

the total distance between the ends of the tube, if the temperature of the wire for the determination of W' and W be equal. If the temperature be not equal, a corresponding correction should be made on l and the whole computed distance to find the correct distance."

Two most abstruse branches of surveying, "Division of Lands" and "Laying out of Railway Curves," are treated in a masterly manner. Intaking of land and surveying of submerged districts are handled ably but briefly. The subjects "Levelling, and Levelling Instruments" are well disposed of. Contour and Mining Surveys, Tunnelling, Latitude, Longitude, and other equally important branches come in for a share of able treatment. The business in the office, plotting-instruments, delineation of contour-surfaces, hill shading, enlarging and diminishing, plans, sections, and the whole art of map making are succinctly discoursed of. Chap. vii., on "Computations," gives many useful formulæ in plane and spherical trigonometry, capable of being understood and employed by the advanced student only, but made to apply to nearly all the subjects contained in the previous portion of the work, and to such student they are invaluable. Chap. viii., on "The Theodolite and other Mathematical Instruments," is fully equal to the same subjects in any general work on instruments—their construction, adjustment and application to surveying being minutely detailed.

The book is well and tastefully got up; the printing, woodcuts, and copperplates being of superior style. To one already taught surveying in the school, this book is highly important for training him in the field and in practice. It contains much useful and curious matter, and is evidently the production of a scholar practised in the art. There is an appendix containing some useful tables, but rather too elementary for insertion. We cordially recommend the book to every student of land surveying and engineering as worthy of the best attention.

PROGRESS OF PUBLIC WORKS IN THE COUNTY DOWN.

No better instance could be shewn of the success attending well-considered projects and the remunerative return of capital, when directed by clear and discerning minds, than in the recent construction of the Downpatrick and Newcastle Railway. This railway, some eleven miles long, is at present worked by the Belfast and County Down Company, to which line it has proved a most valuable feeder. The capital subscribed was mostly local; the contract works let for cash; and the entire line completed within twelve months from commencement, although the works (from the nature of the country having to be traversed) were necessarily of a heavy, unusual, and difficult character. The cost of construction, including stations, sidings, and expensive junctions, exceeded but a little £5,000 per mile. Since the opening of the railway, some six months ago, the receipts have averaged £10 per mile per week. This looks promising, and encouraging to future extensions in other localities requiring branch lines.

It is in contemplation to form a branch railway from Down to Killough and Ardglass, and improve the harbours (by Government aid), thus developing the fisheries and general trade of these ports—now comparatively neglected for want of accommodation,—and establishing the shortest routes between Peel, Isle of Man, Holyhead, Fleetwood, and Liverpool with the North of Ireland.

Another project worthy of attention is the Belfast and Holywood Steamboat and Harbour Company. This company has, at an expenditure of over £11,000, locally subscribed, dredged a deep-water channel, and constructed a new quay and basin at Holywood, upon which route a most comfortable steamer has been placed by the Messrs. Brown, of Belfast, proving a complete financial success and giving great accommodation to the public. It is proposed to give, next year, increased shipping accommodation at this harbour, when a new, safe, and useful port will be established, proving at once of great service to the shipping interests, and remunerating this spirited company for their enterprise.

We also find that a branch railway is being constructed from Comber, a station on the County Down Railway, to Castle Espie Lime (Hoffman's patent) and Brick Works, by their spirited owner, Samuel Murland, Esq. The length of this branch is three miles, passing along a very pretty country, offering capital sites for villa building, and having the advantages of sea-bathing and easy access by rail to Belfast.

The engineer to the foregoing railway and harbour works is Mr. William Lewis, of 43, Dame-street, Dublin, from whose plans and under whose superintendence the works have been carried out.

LISMORE.

LISMORE, or *Lios-Mór*, signifying the "great habitation or fort," gets its name from a Danish fortification in the vicinity, called the Round Hill, and was formerly a famous city, containing an abbey for canons regular, founded by St. Carthage, as many as twenty monasteries and churches, a university, celebrated in ancient times as the resort of numerous philosophers, and a bishop's see. It is now but a small cathedral town, containing less than 3,000 inhabitants, pleasantly situated on the charming River Avonmore, or Blackwater, as it is now called, in the County of Waterford, about 21 miles from Clonmel. This town is well known to tourists

visiting the south of Ireland from its beautiful and magnificent castle, one of the numerous seats of his Grace the Duke of Devonshire. This castle was originally built on the site of the Abbey of St. Carthage by King John, when Earl of Moreton, in 1185. Soon after its erection it was destroyed by the Irish, and afterwards, being rebuilt, it became for ages the residence of the bishops of the see, until Miler Magrath, Archbishop of Cashel and Bishop of Lismore, before his resignation in 1589, granted it to Sir Walter Raleigh, with lands belonging to it, for the yearly rent of £13 6s. 8d. From Sir Walter Raleigh it was purchased by Sir Richard Boyle, afterwards Earl of Cork, who added much to its beauty.* Robert Boyle, the celebrated philosopher, seventh and youngest son of the Earl of Cork, was born in the castle in 1626. From the Earls of Cork and Burlington it descended to the Dukes of Devonshire. It was burned in 1645 by Lord Castlehaven, and was at various times nearly destroyed, and again rebuilt; and has only attained its present splendid and imposing appearance within the last few years. The castle is romantically situated on the Blackwater, on its southern bank, which rises as a perpendicular rocky cliff, in some places nearly one hundred feet from the bed of the river; and its elegant and lofty towers, rising majestically above the beautiful foliage that clothes its base, render it one of the most picturesque residences that the south of Ireland can boast of. The entrance is through a gateway from the south, from which an avenue of stately trees leads to the courtyard of the castle, through a gateway tower, having the arms of the first Earl of Cork, with the motto, "God's providence is our inheritance," sculptured over the doorway. Some of the ancient towers and buildings of the castle still remain. The interior is elegantly fitted up with every modern luxury. The greater part of the south side seen from the garden, the entire of the east front, and the magnificent flanking towers of the north front, are built of Derbyshire stone, from designs by Sir Joseph Paxton. This tower was founded in 1855, in commemoration of the Lord Lieutenant's visit to Lismore; and the foundation stone contains the following inscription:—

THIS STONE,
FORMING PART OF THE FOUNDATION OF A BUILDING TO BE CALLED
THE CARLISLE TOWER,
WAS LAID ON THE 24TH SEPTEMBER, 1855, BY
GEORGE, EARL OF CARLISLE, K.G.,
LORD LIEUTENANT OF IRELAND,
AND IS ERECTED, NOT MERELY TO RECORD THE VISIT PAID DURING
THE FIRST YEAR OF HIS GOVERNMENT, BUT ALSO THE DAWN OF
HAPPY DAYS WHICH HAS AT LENGTH APPEARED TO ILLUMINE
THE PROSPECTS OF IRELAND.

The rock on which the foundation stone was laid is 75 ft. above the river's bed. The base of the tower is 56 ft. square, and it rises 100 ft. from the ground line, and is intended to terminate in four circular turrets, 100 ft. in height, to spring from each angle, thus making the tower between 200 ft. and 300 ft. from the bed of the Blackwater.

THE "EUROPEAN" SWINDLE.

A MEETING of policy-holders in the European Assurance Company was held at 212, Great Brunswick-street, on Saturday, the object being to consider the present state of the company. The chair was occupied by James H. Owen, Esq., C.E. Mr. Shaw, the resident secretary, who was present as a policy-holder, read an extract from the directors' answer to the petition which has been presented to the Vice-Chancellor, stating that the representations in it are wholly untrue, that the company are ready to pay any claim made upon them, and that no claim is at present unpaid. After some discussion, a committee was appointed to watch the proceedings in connection with the petition, and to summon a meeting of the policy-holders at a suitable time.

* He payeth every week in the year two hundred pounds for wages to workmen, and there is maintained by the money that goes out of his purse to labourers four thousand people, young and old, on his lands and plantations, to the great benefit of the commonwealth.—Extract from a manuscript relating to the 1st Earl of Corke. See *Ryland's Waterford*.

† The first doorway is called the riding-house, from its being originally built to accommodate two horsemen, who mounted guard, and for whose reception there were two spaces which are still visible under the archway.—*Ryland's Waterford*.

CHARLES SHEILS AND HIS ALMSHOUSES.

A RECENT number of the *Belfast Newsletter* contains an interesting account of the Sheils' Charity, and of the almshouses to be erected under the provisions of the will of the late Charles Sheils. We transfer to our columns some portion of the narrative:—

On the 21st of December, 1861, Mr. Charles Sheils, a princely merchant, died at Liverpool, leaving behind him an immense fortune which he himself had accumulated. He was born in Killough, in the County of Down, of parents from whom he inherited ability and probity, and but limited means of a more material kind. Lord of those, however, though of no land besides, he early rose to affluence in commercial pursuits. Dying without issue, he devised almost his entire fortune to trustees, to be devoted to charitable purposes. His grand object was to relieve as many as he could of those "who, from their former lives, are entitled to a better provision in old age than the workhouse." The will provides in a very particular and considerate manner for the comfort of the contemplated objects of his bounty, and amongst other matters he requires that near relatives shall be allowed in their decline and decrepitude to associate as they had done in their days of vigour and independence. To carry out his design, five sets of almshouses have been instituted under the provisions of his will—one at Carrickfergus, for Antrim; a second at his native place, Killough, for Down; a third at Dungannon, for County Tyrone; a fourth at Armagh, for that county; and a fifth in the County of Dublin. Each establishment contains twenty almshouses, with a residence for a superintendent. The persons who from time to time shall be admitted must be persons of reduced circumstances, and of good character, and who have been born, or have lived for five years preceding their application, in the county in respect of which it is made. No distinction is allowed in regard to religious persuasion. No adult under forty years of age can be admitted; but children are received with their parents, and orphans are taken charge of and reared by suitable inmates. Now comes the important part of the claim to admission. An annuity of not less than £10 must be secured to each adult inmate, and of £15 for two or more of a family. There are different sizes of houses, to suit families. An adult inmate receives, along with his annuity, a pension of £8 yearly, a comfortable residence, with a certain amount of furniture, and an adequate supply of fire and light. For a child under ten, an allowance of £2 yearly is made, as an addition to its independent annuity; and for one between ten and fifteen, double this sum is granted. Each person or family live in the way and at the cost which, within the limits of their means, appears to suit their own tastes best. The supervision appointed has reference only to good conduct, and the virtue to which common interpretation assigns the next place—namely, cleanliness. The will of Mr. Sheils has been confirmed, and the trust is now regulated by statute. A central board sits in Dublin, and there is, besides, a local board for each county. The Antrim building is now ready, having been completed in February last, upon ground obtained from the Marquis of Downshire.

These Almshouses, situated about a mile from Carrickfergus, stand in the centre of a considerable plot of ground, and are approached by an avenue from the road. Next spring it is intended to plant the space in front with trees. The rere is to be kept as a general yard or airing ground. There are twenty-one houses in the block, which makes up three sides of a quadrangle, the space enclosed forming a sort of courtyard—the airing-ground referred to. The general style is Gothic. At one end of the front there is a tower between 50 ft. and 60 ft. high, which sets off the building to considerable advantage. The principal entrance and the board-room of the local governors are beneath the tower. The entire length of the building is about 230 ft., and

its breadth from the front of the houses to the wall bounding the yard is 123 ft. The materials are of red brick, varied by black bands round the windows; and we may remark in passing, that the walls are built hollow, with a space of about three inches between the outer brick and the inner coating, the object being to prevent dampness. The building is, in all respects, handsome, durable, and commodious, the cost, some £6,000, admitting of attention to all these considerations. The architects were Messrs. Lanyon, Lynn and Lanyon, and the contractors Messrs. Lowry and Son. The twenty-one houses consist of a superintendent's residence, four known as "large" houses, seven as "middle-sized," and nine as "small." The large houses have a kitchen, pantry, scullery, and bed-room on the ground floor, and two rooms up stairs. The middle-sized are without the bed-room down stairs, and the small are less again than the latter by one room upstairs. Each house has a yard, containing washhouse, coalhouse, and closet. There is an ample supply of water for all from Lough Mourne. A certain number of articles—the rudimentary furniture of a house, if we may use the expression—are set aside for each house, viz., an iron bedstead, a mattress and pailasse, six chairs and a table, and a fender and fire-irons. Five of the houses are occupied. Let us add, without venturing beyond the bounds of a proper consideration, that the occupants whom we met, carrying with them into their new abodes the refined and cultivated bearing of their former homes, show that, in one respect at least, they fulfil the requirements of the founder, while in the matter of cleanliness—we had almost said of pathetic tastefulness—they prove how fully they recognise one of the most important of the bye-laws for the regulation of the institution. We need only add that the place is pleasantly and conveniently situated. In front there is the Lough, separating from the Antrim side the fertile shores of Down; behind, a rising ground displaying comfortable cottages and dignified mansions; on the right, Carrickfergus, with its square, squat castle rising gloomily out of the water; while to the east the prospect is closed by a pleasant and cheery view of Eden, and of a place to which literature has lent some fame and some infamy—Kilroot, once the scene of Dean Swift's labours.

FALSENESS IN TRADE.*

So that it seems to be, never mind what it is. Such is the maxim of thousands in this God-fearing country and wonderfully intellectual age. So that a house will just stand, a printed cotton just wash, or a soldier's coat hold together till it is appropriated; so that the inferior stuff at the end of a piece of cloth cannot be discovered till it is opened, and the untimpered worthlessness of the axes and picks will not be known till the bales are broken in the backwoods by eager workers dependent on sound tools, it is all right! trade has been done, profit has been made. Never mind the loss, the disappointment, the sorrow inflicted on others: profit has been made. The falseness and sham, the want of truth on the part of workmen in matters connected with their trade, are little less than appalling. You can be certain of nothing. You may buy pens that will not write, pencils with which you cannot mark, milk innocent of the cow, beer that is poisonous, locks that will not last a week, manure that has no pretence to a fertilizing quality, and seeds that could not grow in it even if it had. These last are amongst the worst kinds of deceptions,—deceptions that cannot be discovered till it is too late to supply a remedy, and the user's hopes for the year are blasted. Nearly the last Act of the past session of Parliament was one to prevent the adulteration of seeds, declaring that the practice of adulterating seeds, in fraud of her Majesty's subjects and to the great detriment of agriculture, required to be repressed by more effectual laws than those in force.

To "kill seeds" means to destroy by artificial means the vitality or germinating power; and to "dye seeds" is to give to seeds by colouring the appearance of seeds of another kind. The penalty is £5 for the first offence and £50 afterwards, with publication of the offender's name at his expense in newspapers. We would have had the punishment heavier. For such scoundrels we have no consideration, no mercy; nor can we see any valid reason why the Act should not have come into operation at once, instead of being postponed, as we believe it is, till the beginning of next year. Surely it is not to enable these honest traders, disappointers of men's hopes, to get rid of adulterated stocks on hand?

The tendency of the world to listen to specious promises, to be beguiled by apparent cheapness, to

"Give to dust that is a little gilt,
More laud than gilt o'er-dusted,"

encourages the vice to which we are pointing, but does not in the least excuse it.

We remember hearing of contractors, during one of the recent wars, who sent out to our soldiers boots so made and of such materials that they became saturated with the first shower, and endured no time. The commonest feelings of humanity, apart from thought of gratitude, prompt indignation, and should have prevented such an infamous proceeding. The indignation it excites within us has no bounds. We say with Emilia, and with our whole heart,—

"O Heaven! that such companions thou'dst unfold,
And put in every honest hand a whip
To lash the rascals naked through the world."

Even this baseness is paralleled, if it be not exceeded, by those who manufacture life-buoys of materials incapable of floating. Hard as it may be to believe, there is good evidence to prove that many of the life-buoys sold at seamen's slop-shops, instead of being stuffed with solid cork-wood, as they should be, are filled with rushes, straw, or cocoa-fibre, which being tied up in canvas will float for a little time, but are gradually saturated, and sink,—destroying what they should have saved. We have talked of whipping, but with the manufacturers of these painted lies, with these murderers for money, we would adopt a shorter course: we would unhesitatingly hang them.

A MONUMENT TO NOAH!

ON Saturday last (says the London *Examiner*) a large meeting of the inhabitants of Dummheitemburg, in the Duchy of Ohnehosen, was assembled for the purpose of celebrating the completion of a monument to Noah, the hero of the Deluge. The people of Ohnehosen are an intelligent and energetic race, and to many of them it has long seemed a scandal and a reproach that no monument should have been erected to commemorate the signal service which Noah rendered to the world. To atone for this neglect, there was formed in 1856 a committee for the purpose of urging the patriotic of all lands to contribute their subscriptions to a general fund, while architects were invited to send in designs for the proposed memorial. A large sum of money was collected; a suitable design was procured; and the inhabitants of Ohnehosen were congratulating themselves on the success of their efforts, when some unfortunate dispute arose among the subscribers. The work was delayed. The project, besides, was sneered at by surrounding countries, who were apparently envious of the glory which the people of Ohnehosen claimed. The design was cavilled at; and historical purists exclaimed against the notion of representing Noah in a dress he never wore. Indeed, the very existence of Noah became a matter of controversy. Under these circumstances the erection of the memorial languished for a while; and it has only been within the past year that the inhabitants of Ohnehosen, feeling that the half-finished monument was a disgrace to the Duchy, set vigorously to work to collect subscriptions and have the erection completed. The ceremony of handing over the custody of the monument to the *Stadtbrigade* (town

* From the *Builder*.

council) of Dummheitenburg took place on Saturday last, when a large number of the populace was assembled. The monument partook of the character of a baronial tower, 220 feet high and 36 feet square. Above the gateway was the figure of the Ark. A spiral staircase led to the spacious chambers, in which it was proposed to place collections of antediluvian remains. On the summit stood a short pedestal, on which was placed a bronze figure of Noah; at each corner of the pedestal a large and beautiful cabbage, the emblem of Ohnehosen. We have only to add to this report a notification of the singular fact that on the very day when the people of Ohnehosen were doing honour to Noah, a number of persons were engaged in celebrating the erection of a statue to Sir William Wallace, at Stirling. There is much comfort in observing that neglected heroes are now beginning to get their due; and we beg to suggest that Brian Boroihme, Ossian, and Adam be added to the list of persons "deserving of a statue!!"

ULSTER BANK BUILDINGS, BELFAST.

THESE new buildings (of which a lithographed illustration is given with this number) are being erected for the Ulster Banking Company, in Waring-street, on the site of some very old and dilapidated premises. The result will be to materially improve the aspect of that street, and to bring more prominently into view the really fine Bank (designed by Mr. James Hamilton, of Glasgow and Belfast). The building which is the subject of our notice is of stone; white Scrabo, finely "sparrow-picked," being used for the general walling, and Dungannon stone, finely wrought, for the dressings. The plinth is of Newry granite, as are also the pilasters (in one stone each) at shops on side elevation.

The main portion of the building will be occupied as offices, the chief entrance being in portion of the building nearest the Bank, and set back from the general frontage line of new offices some 9 ft. or 10 ft., and is approached by a flight of steps, as seen in our view. It is intended to surround the new building with a plinth and railing similar to that at present enclosing Bank. This has, however, been omitted in our view, as it would interfere with the lower portion of the building.

The work is being executed in a very superior style of workmanship, and in a manner most creditable to himself, by Mr. John Murphy, builder, of Great George's-street, from plans by Messrs. Thos. Jackson and Sons, Donegall-place, and under their superintendence.

The estimated cost is about £4,000. The building is to be completed in ten months—a very short time, owing to the difficulty sometimes experienced in providing stone. Up to the present, the building is a few feet over second floor joists; and the date fixed for the completion of the works is 1st March, 1870.

NEW PREMISES, HOLYWOOD, COUNTY DOWN.

THIS building (as we stated in "Notes of Works" in our last number) is being erected for Mr. P. Burns, and is intended to be used as a large tavern, from the designs of Mr. T. Hevey, architect, of Belfast. The material used in the construction is perforated brick and Scrabo stone, the stone being introduced sparingly. The interior doors, fittings, &c., are to be of pitch pine stained and varnished.

To judge from our illustration, the building

seems well adapted for its purpose, and its situation—the angle shown in our lithograph—has an aspect both to the railway station and steamboat pier.

The builder is Mr. William Nimick, of Holywood, and the works are to be finished about March next.

DILAPIDATED HOUSES IN THE CITY.

MR. Thomas Caldwell, agent to Mr. James Duffy, appeared at the Southern Police Court on Tuesday on behalf of the latter gentleman to answer a summons issued at the suit of the Corporation and under the 20th section of the Dublin Improvement Act, for allowing two houses, his property, in Chancery-lane, to remain in a ruinous condition, dangerous to the public. Mr. Barry, of the firm of Smyth and Barry, solicitors to the Corporation, appeared on behalf of that body. Mr. Parke Neville, City Engineer, proved the dangerous state in which the buildings are at present. Mr. Caldwell stated that the premises had only been recently purchased in the Landed Estates Court, and that Mr. Duffy had not yet been put in possession of them; when that was done, all due precautions would be taken for the public safety. Under these circumstances the magistrate made a six weeks' order, and directed that 8s. costs should be paid. Mr. Allingham appeared to answer a similar summons with respect to the house 6 Bride-street. The usual proofs of the state of the building having been given, an order similar to the one above was made, and one likewise in the case of the house, 100 Bride-street, of which Mr. Terence Dennehy holds a lease.

NEW DOCKS AT QUEENSTOWN.

THE ceremony of laying the foundation-stone of these docks took place on Wednesday last. The following is a correct description of what they will be when completed:—The entire area of the new works, measured within the outer limits of the establishment, will be 56 acres, or nearly three times the area of Hanl-bowline, from which it will be separated by a camber, running north and south, and spanned at two points by bridges. The general outline of the yard will be nearly a right angle parallelogram, its longest sides running north and south. The embankment which will enclose the whole will have an average depth of 40 ft., and breadth of 100 ft. The outer face of the embankment will be sea-paved, sloping outwards from the top of the foundation. The embankment will, of course, vary in width at some places, and its upper edges will be cooped with cut limestone. At what may be described as the north-west angle of the area the embankment is penetrated by an entrance 82 ft. wide, closed with a double floating caisson. The depth over the sill will be 32 ft. 8 in. at high water ordinary spring tides. This entrance opens into a magnificent rectangular basin, having an area of 12 acres. The length of the basin will be 900 ft., by 600 ft. wide; its greatest depth at low water ordinary spring tides, 25 ft.; and at high water ordinary spring tides, 37 ft. The embankment enclosing it will be faced with cut limestone on the inner side. This basin will be one of the largest, if not the largest, in the world. It is actually more extensive than the great basin at Portsmouth. From the southern end of the basin two entrances will be open into the dry docks, each of which will be 426 ft. long, the floor 42 ft. 6 in. wide, and the width at the level of the coping stones 108 ft.—the sides of the dock extending outwards and upwards, and built in the usual manner with altars. At present only one of these docks, the western one, will be executed. The depth over the sill of each will be 3 ft. 8 in. at high water ordinary spring tides. The embankment on the western side of the basin will be 300 ft. wide, and between the western edge of the western dock and the camber, 450 ft. There will be a width of embankment between the two docks of nearly

200 ft., and the southern end of each will be 160 ft. from the outer edge of the embankment. Of the total area of proposed work (56 acres) 36 acres have been executed. This includes the entire of the western and northern sides, the greater part of the southern, and portion of the eastern. The principal work now actually in progress is the completion of the embankment walls, for which purpose enormous coffer dams have been constructed, furnished with powerful pumping engines. Upon the embankment at west of basin will be erected extensive stores, and at the wider part of the embankment near the western dock a factory, the present design of which is 400 ft. long by 200 ft. wide. This part of the establishment will be devoted to the repair of ironclad ships and other such works. There will be, within the area of the embankment, 20,000 feet of wharfage accommodation, with all the requisite appliances of powerful cranes, &c. The works have been progressing in a manner to elicit the hearty commendation of the Lords of the admiralty on the occasion of the present visit. The only engineering difficulty which has yet presented itself is, that in excavating beneath the mud, the rock has been found fissured in some places, from which water rises. A powerful steam pump is at present employed in checking this source of inconvenience, which is not likely at any time to prove so serious a difficulty that it may not be coped with successfully by pumping. This work will be executed by a great engine, for which a house 100 ft. by 60 ft. is being erected between the sites of the stores and the factory. The same engine will drive all the machinery of the factory. The works have been erected under the constant supervision of Mr. Wm. Joyce, Clerk of the Works, subject to Colonel Clark's direction and occasional inspection. It only remains to be stated on this part of the subject that vast quantities of material prepared and stacked, including 133,000 cubic feet of limestone cut and dressed for the facing and coping of the embankments. The present rate of expenditure in wages at the works is about £125 per week.

The "foundation-stone," laid on Wednesday, is a limestone block, weighing six tons, containing 79 cubic feet, 12 ft. in length, 4 ft. wide, and 1 ft. 8 in. deep. It bore the following inscription—

"This stone was laid by
Earl Spencer, K.G.,
Lord Lieutenant of Ireland,
September 29th,
1869."

In a cavity beneath the stone was placed a leaden box containing a plan of the works, and a parchment bearing the following inscription—

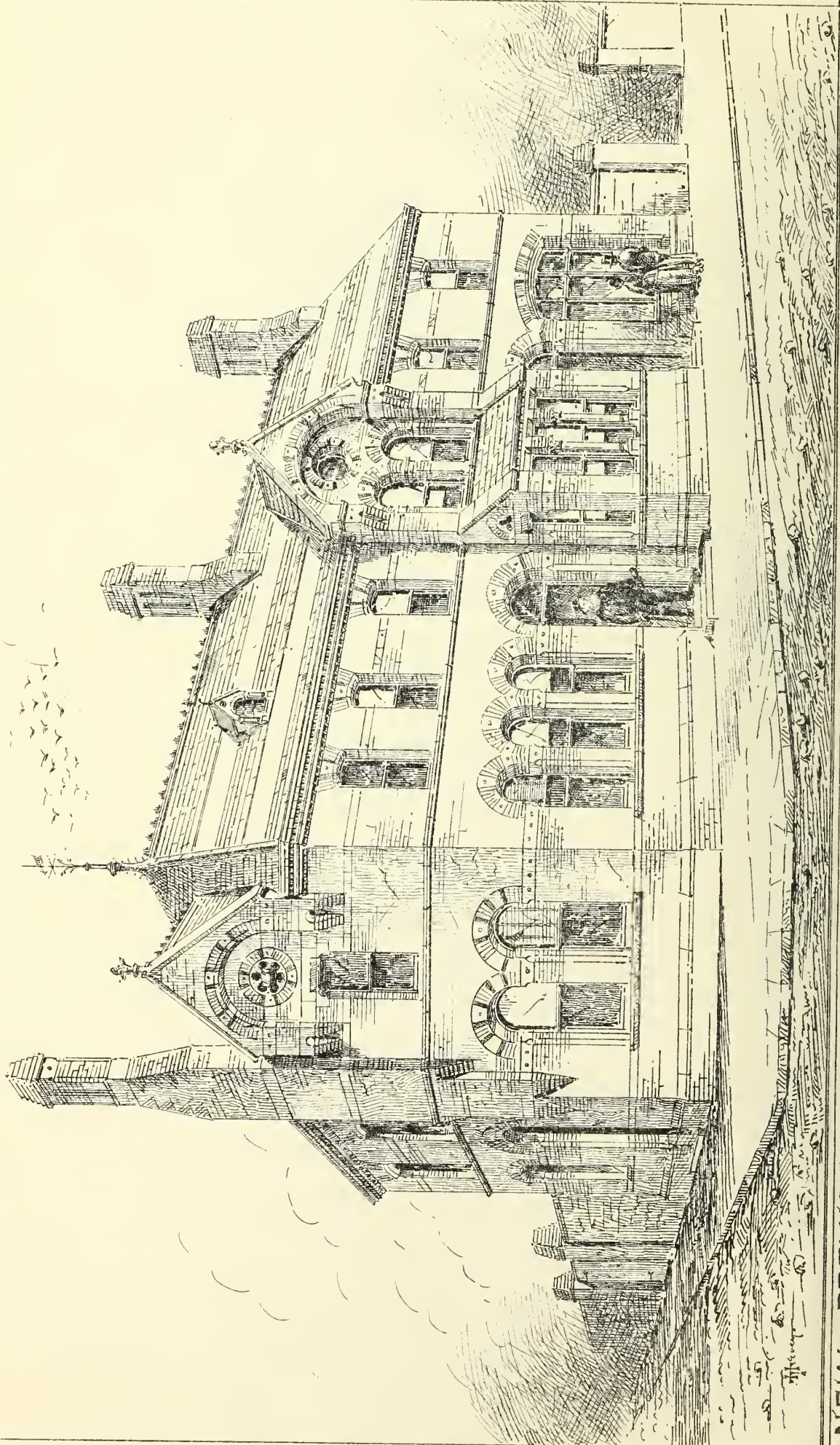
"EXTENSION OF THE NAVAL YARD AT HAULBOWLINE.

The construction of dry docks having been recommended by Committee of the Imperial Parliament, in the 28th year of the reign of her most gracious majesty Queen Victoria, and the naval administration of Edward, twelfth Duke of Somerset, it was commenced in 1866: and those of Sir John Pakington, Henry Corry, and Hugh Culling Eardley Childers, First Lords of the Admiralty, continued those works, when, on the 29th September, 1869, this stone was set by John, fifth Earl Spencer, K.G., Lord Lieutenant of Ireland, in the presence of the Lords Commissioners of the Admiralty, the Right Worshipful the Mayor and Corporation of the city of Cork, the county and city Members, the Flag Officers and Captains of the Channel Squadron, &c."

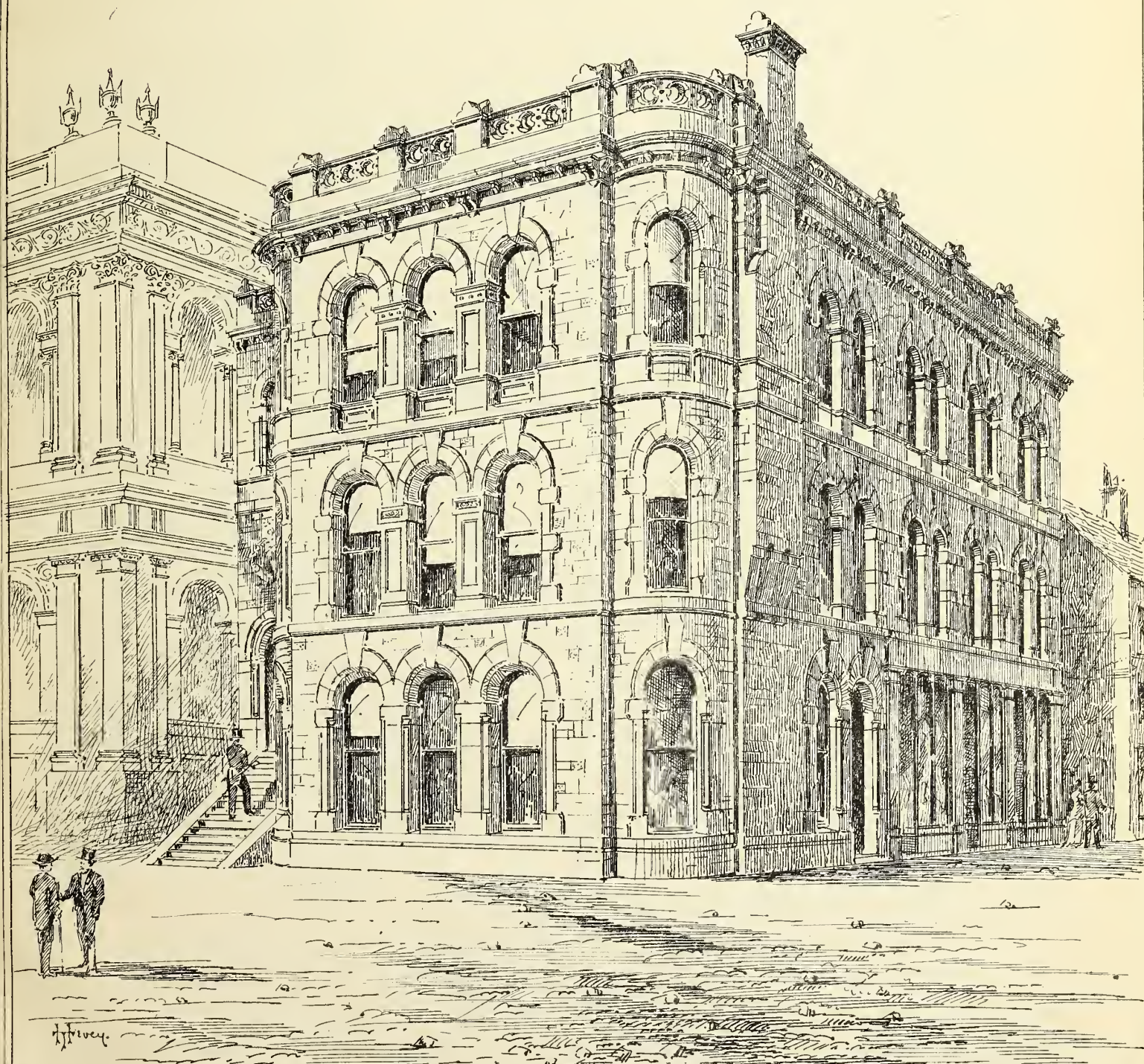
MINING IN IRELAND.

A CORRESPONDENT of the *Mining Journal* writes as follows:—Last week you adverted to the writers of the "Memoirs of the Geological Survey of Ireland," who appear to have done all in their power to prevent capitalists or speculators from undertaking any enterprise in the way of mining in the south-west of the county of Cork. Of course, those gentlemen did not intentionally wish or desire to say anything but what they believed to be true, but really these theorists should have been much more careful before they made the assertions they have in these Memoirs, which are calculated to give a most

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NEW PREMISES FOR M^r. P. BVRNS, SHORE ST, HOLYWOOD, T. HEVEY, ARCHT.



THE ULSTER BANK BUILDINGS, WARING ST. BELFAST.

John Murphy Builder.

Thos. Jackson & Son. Architects.

erroneous impression of the actual and known mineral veins of the district in question.

I was at Skibbereen three weeks ago, and having a few days at my disposal I was requested to visit the Cappagh and other mining properties. I can, therefore, from actual inspection fully confirm your remarks as to the formation of the mineral veins—i.e., they are *not* formed of red sand, grit, copper sand, mud, &c.; but, on the contrary, the veins of ore are most distinct, and as regular as those of Cornwall, and the best proof of this is to be found in the great productiveness of such mines as Berehaven, Browhead, Ballycummisk, Coosheen, Knockmahon, Cappagh, and others.

It is difficult to get at the exact figures, as these mines are, for the most part, being worked privately; but from reliable information I am able to state that Berehaven has returned ores to the extent of £2,000,000, and other mines, such as Knockmahon, and those mentioned by you, are equally productive. The Cappagh Mine, which is not now in work, has sunk a shaft on the lode down to the 90, every fathom of which yielded rich ore, the lode increased in yield every fathom, and in the 90 has proved actually worth £70 or £80 per fm., and practical miners, not “amateur geologists,” assert that these veins of mineral are as certain and as definitely formed as any in the best Cornish mines. It is a matter of astonishment that Cappagh should be allowed to remain idle; perhaps the Memoirs have had an evil influence, for it is certain that if such a property were in this country, or even in South America, it would be readily taken up, and the public asked to give something like £30,000 for the privilege of being allowed to join in the venture. In spite of these Memoirs, however, fortunes will still be made in the mines of the south-west, and a few more examples will bring abundant capital to this part of the “ould” country.

ROYAL COLLEGE OF SCIENCE, ST. STEPHEN'S GREEN.

THE class rooms, laboratories, museum, library, and reading-room of the college are all admirably adapted to their several purposes, and no expense has been spared by the Government department in fitting up and furnishing them. The museum contains models of mining machinery, of iron, zinc, and lead smelting, of chemical and gas works, of the furnaces and kilns employed in the potteries, and a series of models of looms and machines to illustrate the processes of textile manufacture. The Palæontological gallery of the museum contains the collection of fossils made by the Ordnance and Geological Surveys of Ireland, and also a set of duplicates of the English collection. In the gallery devoted to minerals and rocks are an extensive collection of minerals, arranged educationally, and a large series of rocks collected by the Irish Surveys; and a collection by Krantz, of Bonn, of European rocks. The library contains, an extensive and carefully selected collection of works on the subjects taught in the college, and it is not only open to the students for consultation, but they have the privilege of borrowing the books. Class and individual instruction is adopted in teaching many of the subjects, in addition to the professional system and the ordinary class-rooms, as well as those set apart for geometrical and mechanical drawing; and the laboratories are fitted up with the newest and best educational appliances.

THE ATLANTIC CABLE.

THE accident which has caused the parting of the cable has occurred about 70 miles from Heart's Content, near the locality of the former fractures of the line. The injured cable is the one laid in 1866, and which has alone suffered from casualties. The present is the fourth fracture that has occurred in the 1866 cable, on the Newfoundland side. About six weeks ago, a fault was also discovered in the same cable, a short distance from Valentia. A steamer has been for some

time past plying off the harbour, waiting for fair weather, to proceed to the spot where the fault exists, to repair the damage. The cause of these fractures has not yet been distinctly stated; but there is reason to believe that the course taken in laying the cable, the latter portion having been laid in a heavy fog, was over rough sunken rocks, and that the cable has been injured by chafing upon them. The first injury to the cable off Heart's Content had every appearance of having been caused by an iceberg settling down upon it. The second injury bore traces of wilful damage, and suspicion attaches to a strange craft which, during the time of the excitement about the Fenians, was seen hovering near the spot where the rupture took place. The 1865 cable remains safe, as it is laid in a channel that was well and carefully surveyed. But for the singular good look of the Anglo-American company, which had led them to pick up the lost cable of 1865 from the bed of the Atlantic, communication with America would have been interrupted on five occasions, and each time for a considerable period.

WHITWORTH SCHOLARSHIPS.

THE following is a list of the successful candidates, with their ages, occupations, and the number of marks they obtained, who have been reported to the Science and Art Department as entitled to the ten Whitworth Scholarships of £100 a year each:—William H. Greenwood, aged 23, engineer-student at the Mechanics' Institution, Manchester, 143 marks; Thomas A. Hearson, aged 23, engineer-student, Royal School of Naval Architecture, 137 marks; John Hopkinson, B.Sc., aged 19, student at Cambridge University, 134 marks; Thomas S. Elgood, aged 24, mechanical engineer, Leicester, and Owens College, Manchester, 127 marks; George A. Greenhill, aged 21, student at Christ's Hospital School and Cambridge University, 116 marks; John R. Brittle, aged 23, engineer-student at Sir Walter St. John's School, Battersea, 113 marks; Thomas W. Phillips, aged 23, student at British School, Millwall, and Royal College of Science, Dublin, 100 marks; Richard Sennett, aged 21, engineer-student at the Royal School of Naval Architecture, 98 marks; Robert B. Buckley, aged 21, engineer-student at Merchant Taylors' School, 97 marks; Charles E. Leeds, B.A. (Oxon), aged 23, student at Oxford University, 96 marks.

SANDY-ROW ORANGE HALL.

WE learn from the local journals that the new Orange Hall, Sandy-row, Belfast, was formally opened on Friday evening, 24th ult. This hall, the foundation-stone of which was laid by William Johnston, Esq., M.P., about twelve months ago, was finished on the 1st of June last. It is a neat brick structure, situated at the upper extremity of Sandy-row, and is fitted up with every accommodation for both the public and private meetings of the brethren. In addition to a large hall situated on the first floor, which is well adapted for lectures, soirees, and other public meetings, there are eight minor rooms, which can be used for private meetings and reading-rooms. The cost of the building was about £430, and the work is executed in a manner creditable to the builder, Mr. Smith.

“CAPS” AND “RATS.”

THE master of a south-eastern workhouse reports to the guardians that “the chimney caps require pointing. There is a rat-hole cut in the boarding of the infant school! I would respectfully suggest that something be done to banish rats from this department before matters get worse! I respectfully ask the board will appoint a committee to examine the sewers in the scullery yard, with a view to change their direction, the main running quite close to the pump which supplies the house with water”!!

At a subsequent meeting (as we learn from the local journal) the master reported that

“the contractor refuses to point the chimney caps”!! It was of some importance (he said) to have the caps secured, as, if frost succeeded wet weather, the frozen water would endanger the chimneys.

A guardian considered the *thaw* would be most injurious to the chimneys. The present contract would terminate in 1870. He suggested that it would be well to appoint a committee to draw up a specification of the work to be done at the roofs, to prevent misunderstanding about the work to be done by the contractor!

The consideration of how the caps were to be secured was adjourned.

In reference to a letter from the commissioners on the *very important* rat matter, a guardian recommended traps to catch the rats.

The master said they tried traps, but the rats would not go into them! There had been a girl some time ago in the house, and she was able to set a trap and catch a rat *in about ten minutes after*. While she remained in the house the rats were thinning, and after she left they began to increase again.

It was agreed to try phosphorus paste to thin them off!!!

[We would recommend the master to place himself in communication with Mr. Kearney, 4, Nottingham-parade, North Strand Road, Dublin, who will put him in possession of something that will soon rid him of his *rat-ocratic* intruders.—Ed. I. B.]

NOTES OF WORKS.

Extensive alterations and additions are being made to the warehouse of Messrs. A. Woods and Co., Temple-lane. The new buildings will extend into Cecilia and Crow streets, and comprise a large suite of offices, with fire-proof vaults underneath, and three storeys of lofts over, supported on strong flitched beams. Mr. Charles A. Barton, of 11, Suffolk-street, is the architect, and Mr. G. Hudson the builder. Quantities supplied by Mr. P. Gilfoyle, building surveyor.

The printing establishment of Mr. Atkinson, 72, Grafton-street, recently destroyed by fire, is now being rebuilt. Mr. Charles A. Barton is the architect, and Mr. Lamb the builder.

The designs of Messrs. Boyd and Batt, Donegall-square, Belfast, have been selected for the “Filgate Hall,” Ardee. The cost is not to exceed £1,000. There were seventeen competitors.

The new church of St. Anne, Dungannon, was consecrated on Friday. The style is Decorated Gothic, and it has been erected at a cost of about £8,500. Sittings for about 800 persons are provided.

Messrs. Thomas Dixon and Co. have been declared the contractors for additions and alterations to Ballycraig Manor, Antrim, for J. Chaine, Esq. Amount of estimate, £3,000. The works are to be forthwith commenced.

A new station at Kilroot, on the Carrickfergus and Larne Railway, is to be built for C. R. Dobbs, Esq., by Messrs. Dixon and Co.

A new Catholic church is to be erected at Enniskean, Co. Cork. A sum of £800 was collected at a preliminary meeting of the parishioners.

To our notice in last number, of the works at present being carried on at 2 and 3, Merriam-row, under the directions of Mr. Charles Geoghegan, architect, we should have added that the bills of quantities were prepared and supplied by Mr. P. Gilfoyle, building surveyor, of 11, Suffolk-street.

ALDERWOOD.

SIR,—I am about to use a quantity of alder, and not having worked any of this kind of wood before, I shall feel obliged if any of your correspondents can tell me how long it requires to season. I am told it differs from other woods in not splitting or warping, and may be used directly after it is sawn. C. E.

THE SCIENCE OF KILLING.*

From almost the very earliest ages, the science of killing and destroying, or the art of death made easy, seems to have been a careful and practical study in connection with any and every kind of fighting and warfare, whether public or private, whether personal quarrel or vengeance or State aggression or ambition. Man being but imperfectly provided with natural weapons, his instincts prompted him to supply from the readiest sources what nature had denied. The earliest kind of weapon was therefore, naturally enough, formed of material most handy, wood or stone, and from the days of the club, the celt, the flint spear-head, the idea of improving these life-destroyers has been going on, slowly enough perhaps, but steadily, carefully, and surely. And thus it is that, thanks to the ceaseless ingenuity of man, the rough celt became the highly-finished battle-axe of polished steel, the rude spear, the ponderous lance, that queen of weapons of the days of chivalry,—the old English long bow gave place to the match-lock, which, after undergoing the various changes of wheel, lock, snaphaunce, flint and percussion, at length appears in the more perfect Snider, Chassepot, or Henry-Martini—all of which, although we now think proper to call them perfect, it is not too much to say may, ere another century has passed away, be entirely superseded by something more utterly terrible than we can at this moment form even the remotest idea of. This is by no means a vague assertion, when we reflect an instant and compare what *was* with what *is*. The cannon of the fourteenth century, formed of iron bars hooped together with iron rings, and suspended in chains, or fixed on a clumsy timber carriage and “planted,” in the literal and truest meaning of the word, in the earth, have given place to field-pieces which can be whirled along with a speed and dexterity almost marvellous to behold; and guns of position of a weight and calibre utterly incredible. The ponderous matchlock arquebus, so heavy that it was fired from a rest which the poor over-burdened soldier carried with him, and all its complicated adjuncts to loading, namely, the powder-horn, the ball-bag, the touch-box, the scouring-stick, and the coil of lighted match, which latter placed the wretched soldier in constant danger of blowing himself up much more frequently than his enemies, and yet, with all this cumbersome machinery, it is doubtful whether a dozen or so shots an hour could be got off. In place of this we have a modern weapon which can fire fifteen rounds, or more, per minute, with the greatest ease and precision. If we add to this, mortar-practice, shells, rockets, torpedoes, and iron armour for ships and fortresses, we repeat that it is not too much to say that the inventive genius of another century—aye, or even half a century—may, in the interesting and inviting science of killing, be enabled to produce an engine of such wholesale slaughter and sweeping destruction, as will throw the whole of our boasted modern improvements entirely into the shade.

Modern science has been busy, especially in the late American War, in the production of an entirely new kind of offensive weapon, which we believe is strictly a modern invention, and may be considered as yet quite in its infancy, and very far from perfect. We allude to the torpedo, an engine to be used against enemy's ships, and especially for the defence of coasts, harbours, and rivers. Many plans on this subject have been devised, as the readers of Colonel Von Scheliha's work on marine defences are aware; but the great obstacle always appears to be, not that the engine in itself wants power, or that any difficulty exists as to firing it, but to conduct or direct it to the right place, that is, exactly under the bilge of an enemy's ship. This must necessarily be left very much to the chances of tide or current when the torpedo is not fixed on a particular spot. To obviate this to a certain extent, and to guide and control the movements of the torpedo, an

officer of the Navy, Captain Harvey, has brought out a machine which he proposes to tow direct against an enemy's ship, adopting the principle of a canal boat which always keeps in the middle of the stream because the tow rope is secured, not to its bow, but to its *side*. The torpedo will be submerged, but its course will be indicated to the towing party by a small buoy attached to it, and floating astern. On striking either the side or bottom of the hostile vessel, the explosion is immediately effected by means of a bolt charged with fulminating powder, and acted on by two ingeniously contrived levers. The invention has been tried with great success at Milford Haven, in the presence of the Floating Obstruction Committee; but one question, however, is most obvious, and that is, what would an enemy's ship be about, while sailing in hostile waters, to permit the approach of any craft whatever, whether large or small? We cannot help fearing it would go rather hard with the towing party. The most startling, and we believe the newest, invention in the science of sudden death, has lately been brought forward by a certain Lieutenant Lupis, of the Austrian Navy. He shapes his torpedo exactly like a large fish, some twelve or fourteen feet long, made of iron, so as to float just below the water. The head is to be charged with gun-cotton and nitro-glycerine, and fitted all over with percussion pins, which would explode the charge on contact with the ship. A screw propeller in the tail is worked by compressed air-pressure contained in the belly of this marine monster, and which gives her a speed, whilst the air lasts, of nearly nine miles an hour. To launch and give her a proper direction appears to be the most difficult part of the business, involving the nicest calculations of time, distance, power, and speed. We are informed that this ingenious arrangement for multiplied slaughter has been tried with immense success at Trieste, and it is stated that such are its tremendous powers of destruction that no ship afloat, whether iron or wood, could possibly outlive the attack of such an infernal machine; for she would inevitably be blown to pieces in an instant. So much for the last two inventions for submarine attack; and, remembering the number of ingenious and busy spirits who are now, and will always be, at work in the mysterious science of killing, we are tempted to ask, in the words of Cobden's celebrated pamphlet, “What next—and next?”

A NEW PYROTECHNIC COMBINATION.

PROFESSOR NICKELS, of the United States, has found that if chloride of copper (commercial) be mixed with sulphide of carbon—the former in the solid state, we presume—some phosphorus having been previously dissolved in the sulphide of carbon, the mixture, although it smokes, does not inflame. If, however, in this state a few bubbles of ammoniacal gas be passed through the mixture, or if a little liquid ammonia be poured into it, the whole instantly bursts into flame. What a capital device this for theatrical use, where enchanters' cups or magic chalices are to present a foretaste of the *inferno* to the guilty lips about to quaff them!

We recently witnessed at the Grand Opera at Paris one of the most elegant and effective stage applications we have ever beheld, of a very beautiful and not common-lecture experiment in physical optics combined with pyrotechnics.

In the well-known scene in the opera of “Faust,” when Mephistopheles taps the great wine vat in Auerbach's cellar—and, as usually performed, in place of wine coming forth a squib begins to sputter and sparkle—a thick column of real water issued from the cask and appeared upon the slightly darkened stage as a parabolic jet or column of wine-coloured liquid fire, like fluid cast-iron tapped from a cupola, and fell bubbling and splashing into a great open wine-tub. Into this the students and people around began to dip and fill their cups, but no sooner had the apparent red-hot

wine reached the mid-depth of the tub than it all seemed to burst into flame, just as they attempted to dip out of it, and the whole became a cauldron of fire and white ascending smoke: the effect was as striking and terrible as it was new.

Those who have attended Dr. Tyndall's lectures on “Light” at the Royal Institution will have seen him perform an experiment (of Jamin's, if we mistake not), which is the key to this. If, in a cylindrical vessel maintained full of water, a lateral adjutage be made, so that a spouting column issuing nearly horizontally falls in a parabola into a tub some feet below, and if at the opposite side of the vessel to the adjutage a glazed aperture be formed, so that a parallel beam from the electric light can be directed through or across the water in the cylindric vessel, and entering the water also of the jet as it issues from the same, the light will be reflected from point to point downwards in successive lines parallel to tangents to the bounding surfaces of the jet, *i. e.* from the bounding surfaces of the denser medium. The light is thus, as it were, conducted along the jet in its own curve, and the whole jet becomes luminous, as does every drop that sparkles and breaks from it on falling. If the glass diaphragm behind the adjutage be colourless, the falling jet column appears of yellowish or nearly colourless light, but if that diaphragm be of orange-red glass, so as to colour the light transmitted into the jet, the latter appears as perfectly like molten cast-iron as anything can be.

This was the method employed upon the stage at the opera upon a grand scale, the jet being about 2½ inches in diameter.

The fireworks in the tub were most probably ignited by the help of pellets of potassium included in them and arranged round the interior of the tub, so that as the water reached these they ignited, on principles well known. How is it that those who direct the pyrotechnics at the Crystal Palace have never discerned the wonderful effects that might be produced by such *internal* and coloured illumination as this of the huge jets of the great fountains—one or all? it could be done at a very moderate expense. On a smaller scale it was done twenty years ago with the central fountain at the Alhambra in Leicester-square, when that was first established as a scientific exhibition under the charge of the late Mr. E. Clarke. The internal illumination there of the jet of 50 feet in height in the darkened building, changing successively to all the colours of the spectrum, formed the most striking and popular exhibition of the grand philosophical toy-shop, which unfortunately did not pay as well as ballets and comic songs do there now. The Crystal Palace, however, presents facilities for a similar exhibition unique in its grandeur and beauty anywhere else in the world. We wish the directors would take our hint.—*Prac. Mec. Jour.*

MEETING OF “EUROPEAN” POLICY-HOLDERS.

WE give below a condensed report of what took place on Saturday at a meeting of policy-holders and others interested in the European Assurance Company.

The chairman (J. H. Owen, Esq., C.E.) said the object in calling the meeting together was, of course, a very indefinite one. The great distance which they were from head quarters, the studied reticence that had been always observed in every account that had been issued by the society as to anything that would enable a person to ascertain its exact financial position, left them so wholly ignorant of what their prospects were, that they could by their meeting come to no fixed resolution beyond what he would suggest, namely—to form amongst themselves a body, limited in numbers, in the members of which they would have confidence, who would endeavour to gather information as to what were the chances of getting anything out of the wreck, and also strengthen the hands of their brother shareholders and annuitants on the other side of the water who were likely to take proceedings against the directors. It was exceedingly important that they should have the means of assuring themselves that the proceedings which were about to be taken were not collusive

* From the *Broad Arrow*.

with the present directory or the managers of the society. Their only safety appeared to him in behaving in a manner the very opposite to that in which they had hitherto behaved. They had trusted the society for the great and high names which were upon the directory, but they had found by bitter experience that the trust had been misplaced, and they would now seek safety in reversing the principle of British law, and in considering every man a rogue until he was proved to be innocent! These were harsh words, but he felt himself justified in using them, when he looked back to the very recent proceedings of the society. Only nine days ago, the doubts that were expressed as to its position were characterized by one of their officers as being "malignant and purpose-serving statements. . . . The misfortune is that the badly-managed business of the Albert has given so much scope to interested and designing persons as to render it almost impossible in the present state of the public mind to do anything that would be reasonably satisfactory." The chairman of the society, a general in the army and a Knight of Hanover, and a scientific engineer belonging to the Royal Engineers, and therefore not so liable as others to be misled by accounts, used these words on the 15th of May:—"We do not hear of people being defrauded by assurance companies. I am quite certain of this. So long as I have the honour of being with you, nobody shall be defrauded here. I stand here as a man who has been connected with assurance companies for upwards of thirty years, and everybody has been satisfied, fully satisfied; every claim has been paid, fully paid, and promptly paid; and I hope that that will be the course of this institution—to pay everybody what is due to them, and to pay them as promptly as circumstances will admit. . . . I am myself a large policy-holder. I was in the 'Royal Naval and Military,' because on starting that company I for one thought that every director should be a policy-holder, to show the confidence he had in the institution. That was my principle in establishing the institution, and I have carried it on here, and if I had to insure my life further it would be in this office." That gentleman was in the position of a paid officer of the society, a position which required of him a perfect knowledge of the accounts and all the transactions of the society. In making such a statement, he must have either been ignorant of the condition of affairs, or else had misrepresented the facts. At the same meeting the manager had declared that he opened 400 letters every morning, and that he would never delegate it to any one else so long as he could do it himself, inasmuch as he became acquainted with the affairs of the society! If he had a perfect knowledge of the position of the society, what justification could there be for the circumstances which had rendered that meeting necessary? The society had responsibilities amounting to ten millions, and only about half a million to meet them.

The chairman then called on Mr. Sanger to lay before the meeting a statement of the condition of the society so far as he at present knew, and said he would afterwards submit some resolutions to the meeting.

Mr. J. H. Sanger said the liabilities of the company amounted to several millions. There was £100,000 due on policies, and there was only £10,000 in the bankers' hands to meet the claims. On the 31st December last the liabilities were from nine to ten millions, and he believed an actuary would tell them that the company ought to have three millions in invested funds, in order to place the society in a solvent condition. They had only £700,000 of invested assets, amongst which he found an item of £350,000, which, it was stated, included mortgages, life interests, reversions, and balances of purchases of business accounts. How much was to be debited to the latter item he could not possibly tell. The subscribed capital was £780,000; paid up, £234,000; and shareholders were liable to calls for £346,000. The company was established in 1859, under the title of "The People's Provident Society." It has amalgamated since with thirty-three other companies, and he thought the policy-holders should know the price paid for each, and the amount paid to the directors and the officers, either by way of compensation or as annuities. He would also much like to know whether the manager of the society was paid by salary and commission, or by salary only, because it was important for the policy-holders to know whether the manager had had an interest in increasing the gross income of the society; for in that case it would not matter to him whether lives were bad or good, so long as he got his commission. When he joined the society, in 1860, the president was Mr. Milner Gibson, M.P.; and, besides other members of Parliament, there were on the board Mr. G. A. Hamilton, M.P., and Mr. Richard Spooner, M.P. He ventured to say that no society in the United Kingdom ever had on its directory gentlemen in whom the public could place greater confidence. He was not actuated by any desire to injure the prospects of the company;

and, if they could show him that it was his interest to continue paying, he would do so.

Mr. J. W. Rosenthal asked if there was any statement of the number of shareholders in Ireland?

Mr. Shaw (resident secretary in Dublin) said he came to the meeting as a policy-holder, and to give the meeting any information in his power.

Mr. Rosenthal—What is the amount held by policy-holders in Dublin alone, and then throughout Ireland?

Mr. Shaw—I could not tell you with accuracy just now.

A policy-holder said he did not pay Mr. Shaw. Other offices had been amalgamated at different times, and he thought Mr. Bentley was the agent of these transfers.

Mr. Shaw said a great number of offices had amalgamated with another company, which finally was merged in the "European." For instance, the "British Nation" had absorbed most of the thirty-three mentioned, and of these, Mr. Bentley was the agent of the "British Commercial." He continued to receive all the policies in his agency, and it was almost a similar case with the others, so that he had only the actual business done by the "People's Provident" and the "European." With regard to the observations of the chairman, he would only remark that there was no unsatisfied claim in Dublin or in Ireland, nor had there been. He was sure there were many present who could state the promptitude with which the claims had been always paid.

Mr. Rosenthal—Do you think the company is solvent?

Mr. Shaw—I believe it to be so, and I have no information to the contrary. I think, until the petition is answered, it is almost premature to form any opinion. I am not in a position to give any statistical information; but the directors, in a circular which I received this morning, state that there is not a claim remaining unpaid or which they are not prepared to pay. They go on to say, in their answer to the petition, "The statement in the said petition, that the said society is altogether insolvent and unable to pay its debts, is untrue. The moneys available for payment of current claims are sufficient for the purpose, and the assets and subscribed capital are and will be sufficient to provide for every liability as the same may arise. The said society does, in fact, pay its debts, and there is not a single undisputed and due policy claim remaining unpaid, or which the board is not prepared to pay; and no debt of which payment has been asked of the said society remains at the present moment unpaid, or which the board is not prepared to pay."

The Rev. Thomas Marshall said he thought until the petition had received the careful attention of the Vice-Chancellor of England, they would be a little premature in coming to any hostile conclusion by which the society and their own prospects might be damaged. As to what moneys had been paid for amalgamation, they were in the dark, and were likely to remain so, unless they had some tangible point on which they could reach the individuals who were called the managers. The "British Commercial," the "British Nation," and the "European" enjoyed the beneficial state of having managing directors, whose business it was to keep everybody in the dark but themselves. The "British Commercial" had a managing director who assured the world that his company was as sound as the Bank of England itself, and he was believed, until one morning he had an attack of gout, and it was then found that there was a deficit of a quarter of a million. He took occasion to quit the country, and had not since returned. He believed the "British Nation" was somewhat like that, and the absence of a confidential clerk disclosed the negotiations which were going on for a transfer. When in London he asked the manager how it was that the actuary had valued one company's business at so much, and another at so much more with less income, and the answer was that he was to look to the stability of the directors. It subsequently transpired that the moderate fee of the actuary for the valuation was £3,000. In the case of the "Pelican," which came before Vice-Chancellor Wood, on a motion for leave to amalgamate, he required the personal obligation of each director of the two companies before he would grant the motion; and if that had been done in their case, the amalgamation would never have taken place.

Mr. McComas said he had been paying to the "British Commercial," for 35 years, and he knew nothing of the "European." He hoped it was not true that men who became tired of their business or wasted it could hand it over to others without the consent of the policy-holders.

Rev. Mr. Marshall moved the following resolution:—"That it is the opinion of this meeting that the state of the affairs of the European Assurance Company, as disclosed before the English Court of Chancery, imperatively calls for united action on the part of the policy-holders and annuitants of the said company, to take measures for the preservation of their interests as far as present circumstances will permit."

Mr. Sanger having seconded the resolution, it was carried unanimously.

Alderman Hamilton said he represented one or two interests in the company, and it had been suggested that any fund paid in towards the premiums should be placed to a separate account, and if there were a guarantee that if the policies turned out to be valueless, these sums would be given back, he could understand it. He was there for a gentleman who held largely in the company, and some of the premiums would fall due in a very short time, and it was difficult to say whether he ought to pay them. He thought they ought to have the advice of counsel upon the matter. He should like to know whether to delay paying would vitiate the policies, seeing that the company was in a state of suspension.

A Policy-holder—That is beyond all question.

The chairman said no doubt the same rule would be made in this case by the Vice-Chancellor as he had made in that of the "Albert."

Mr. Rosenthal said he had a policy the premium of which fell due on the 13th, and it was his intention to pay it, as he was under the impression that the policy would otherwise lapse. He believed that had been held to be beyond all dispute. There was no order at present suspending the company.

Mr. Sanger thought it would be inadvisable not to pay the premiums, for the Vice-Chancellor had made an order in the case of the "Albert," that the money should be paid to a separate account, and refunded if an arrangement were not effected.

The following resolution was passed:—

"That a committee of three gentlemen be named, viz., J. H. Owen, Esq., C.E., Boards of Works; J. H. Sanger, Esq., manager, British and Irish Magnetic Telegraph Company; and Samuel McComas, Esq., J.P., to watch over the proceedings, and to summon a meeting again at a fitting time."

NEW PATENTS.

Mr. John Page, of Glasgow, has specified a patent relating to pipejoints and cement for the same, also suitable for cementing other articles, such as building materials. This invention has principally for its object to obtain a simple, durable, strong and inexpensive joint for pipes, and in carrying it out improved cement is used, which is also suitable for cementing other articles, such as building materials. This joint is more particularly, although not exclusively, suitable for cast-iron pipes, such as are used for conveying water or gas, and is such that turning and boring of the spigots and faucets may be dispensed with, or the two modes may be used in combination. The pipes may be made with alternate spigot and faucet ends to joint into each other, or with both ends, as spigots, to be jointed by means of overlapping rings. The joint effectually prevents leakage, and also acts as a tie to prevent the pipe-lengths from being drawn or forced asunder. The cement is made by mixing with 300 parts by weight of Portland or other hydraulic cement about 100 parts of iron turnings or filings, or of any iron oxide reduced to powder, and about one part of ammonium chloride with about two parts of sulphur. The ferruginous refuse of sulphur copper ores may be substituted for the iron turnings. The cement is made up with water, and sets rapidly after being rammed in, whilst it can be easily removed by a chipping-tool when required.

Mr. Thomas Mortlock, of Hoxton, has obtained a patent for an invention relating to apparatus for leveling, furrowing, and dressing millstones. To carry out this invention a metal frame is employed, truly planed and faced on the under side, which, when the apparatus is in use, rests on the stone to be operated on, and is there kept in place by its own weight. On the frame a carriage is mounted, and it is capable of sliding along it on guides from end to end, a motion which is given to it by manual labour. The carriage has upon it a tool-holder, capable of being traversed across the carriage by a screw. In the tool-holder is fixed a tool, it may be a diamond or steel point or cutter, and as the carriage is moved along the frame, the tool traces lines upon the face of the stone. The point or tool is set down to the depth required by a screw, and with the tool-holder it is moved a minute distance across the carriage before each forward traverse of the carriage; the motion is given by the screw of the carriage operated on by a self-acting ratchet and pawl. Thus it will be seen that at each action the cutter forms a minute and perfectly true groove on the stone, either on the face or in the furrow, as the case may be, and these lines being repeated very closely together, and parallel the one to the other, the required level and roughened face is given to the stone, and the furrows are made and kept of the proper depth. When one quarter or part of the stone is complete, the frame is shifted on to the next quarter or part, which is similarly operated upon, and so the operation goes on until the work on the stone is complete.

MISCELLANEOUS.

The extensive premises of Messrs. Hunt and Co., wholesale druggists, Westland-row, were completely destroyed by fire on the 21st ult. The damage done was considerable, but it is covered by insurance in the Manchester Fire Office.

The cubic contents of St. Paul's are, in round numbers, 5,000,000 ft., the dome itself containing 2,000,000 ft., about equal to the whole capacity of Westminster Abbey. It is thoroughly warmed by the use of the well-known Gurney stoves, thirteen of which are placed in the crypt, and have large gratings over them, through which the warm air ascends—while others are provided with downcasts for the cold descending current to be warmed. The cost of the fuel is about 1d. per hour for each stove; the average cost of the whole fuel consumed during the three winter months is not more than 5s. per week.

The *North American Review* states that there are now in America and Europe more than a hundred and fifty manufactories of india-rubber articles, employing from four to five hundred operatives each, and consuming more than ten millions of pounds of gum per annum. The business, too, is considered to be still in its infancy. Certainly it is increasing. Nevertheless there is no possibility of the demand exceeding the supply. The belt of land around the globe, five hundred miles north and five hundred miles south of the equator, abounds in trees producing the gum; and they can be tapped, it is said, for twenty successive seasons. Forty-three thousand of these trees have been counted in a tract of country thirty miles long and eight wide. Each tree yields an average of three tablespoonfuls of sap daily, but the trees are so close together that one man can gather the sap of eighty in a day.

Mr. James Young, whose name is known chiefly as proprietor of certain paraffin oil works in Scotland, has presented 10,000 guineas for the permanent endowment of a chair of technical chemistry in the Andersonian University, Glasgow, with liberty to found scholarships and bursaries in connection therewith.

THE RIGHT MAN IN THE RIGHT PLACE AGAIN.—We learn from the *San Francisco Newsletter* that an admiral has been ordered to survey a ship-canal route across the Isthmus of Darien. We presume that a civil engineer will be ordered to take command of the Fleet next!—*Fun.*

GALWAY TOWN CLOCK.—It is really surprising that the town commissioners, who think nothing of an outlay of £1,000 in connection with the water-works, should be so niggardly about setting to right the town clock. A correspondent writes a warm letter, and justly designates it "a perfect disgrace to the town." We trust the town commissioners will, at their next meeting, consider the advisability of expending the sum necessary to repair it—a sum of £10,—and not have it an odium to the town. We trust the town board will act on this suggestion, and prevent the necessity of again referring to the matter. —*Galway Vindicator.*

THE PUBLIC CLOCK THAT STRUCK THIRTEEN AT MIDNIGHT.—Most people have heard something about the tradition, that a soldier, whilst on guard at Windsor Castle, during the reign of William III., declared that he heard the clock of St. Paul's Cathedral strike thirteen at midnight. Here is the original story—not generally known—which I take from the *The Public Advertiser* of Friday, June 22, 1770, now before me:—"Mr. John Hatfield, who died last Monday at his house in Glasshouse-yard, Aldersgate, aged 102, was a soldier in the reign of William and Mary, and the person who was tried and condemned by a court-martial for falling asleep on his duty upon the Terrace at Windsor. He absolutely denied the charge against him, and solemnly declared that he heard St. Paul's clock strike thirteen, the truth of which was much doubted by the Court, because of the great distance. But whilst he was under sentence of death, affidavit was made by several persons that the clock actually did strike thirteen instead of twelve; whereupon he received his Majesty's pardon. The above his friends caused to be engraved on his plate, to satisfy the world of the truth of a story which had been much doubted, though he had often confirmed it to many gentlemen, and, a few days before his death, told it to several of his neighbours. He enjoyed his sight and memory to the day of his death." But, as I stated in the *Builder* of December 14, 1867—when I gave my first account of the Great Bell—the sentinel must have spoken of the clock that struck upon "Great Tom at Westminster," for St. Paul's Cathedral had not then any public clock.—*Builder.*

A discovery made in demolishing an old house in Strasburg, of a portion of an antique bas-relief on a pavement-stone, is supposed to confirm the alleged fact of the diffusion of foreign forms of worship among the Gauls. On the stone there appears a divine

figure, all but undraped, bearded, of imposing features and with double pairs of wings. A key is in his left, a sceptre in his right hand. Behind him is a lion passant. At each foot is a vase or bowl, overturned. That at the right foot is broken; a serpent issues from the fragments, wreathing itself round the handle. The style is vigorous, yet not ungraceful. The work is conjectured to be of the time of the Antonines. The divine figure supposed to be that of the tutelary divinity of the house which was formerly on the site. Local savants are divided between Mithra and Eon, as here represented. The prevailing opinion is for the latter, as traces of his worship are said, by French archaeologists, to be found as far west as the British Isles.

At the annual meeting of the Liverpool Sewage Utilization Company, the report presented stated that a 9-in. pipe had been laid from the pumping station in the Commercial-road to Ince Blundell, where a small farm of forty-five acres has been taken to test the value of the sewage, and on which it is now being plentifully applied as well as on a farm of Lord Sefton's. So far the experiment has been successful, although from the company having had to go to Ince Blundell instead of to Blundell Sands, as originally intended, the expenses had been greater than was calculated upon, the result had been a deficit of about £3,500. The chairman said there was no doubt that if the company could dispose of all the sewage they could supply at 3d. per ton, there would be a return of twenty per cent. on the outlay! In reply to a question whether the corporation of Liverpool would assist the company in raising the £3,500, Mr. Bowring said he believed the corporation thought that they had gone far enough in the matter.

A telegraph cable between Caithness and Orkney has been successfully laid in the Pentland Firth. The distance across the Firth is eight miles, and the time occupied in the submersion of the cable was only 21½ hours.

Mr. J. Clark, of the firm of Messrs. Wilken and Clark, of London, claims to have invented an apparatus by which a continuous brake, self-applied, is attached to every carriage of a train, so that in case any portion of the train, breaking away on an incline, the brake is at once brought into operation by the accident alone, and the carriages brought to a standstill. An experimental train, with the Clark brake applied, has been running during the last few days between Leeds and Bradford, and has been proved to be completely under control.

SINGULAR FRAUD.—The Military Council of Revision at aGranne, in France, recently discovered a singular fraud to escape service in the army. Four conscripts successively presented themselves for the medical visit, all apparently blind of one eye, the pupil of which was enormously dilated. Three of the young men were exempted, but on the fourth appearing, the coincidence seemed so remarkable that the members of the council questioned him closely, and becoming embarrassed, he at last acknowledged that the apparent infirmity had been produced by rubbing the eye that morning with a pomade of belladonna. The three other conscripts were called back, and having acknowledged that they had had recourse to the same means, were all declared good for the service. A singular fact was that there had been no concert between the young men, and that the operations had been performed by different persons, who appear to make a trade of such frauds. All the parties have since been prosecuted, and the young men have been now each sentenced to one month's imprisonment, the operator to one year of the same punishment, and some persons who had acted as intermediaries to three months each.

Messrs. Simons and Co., Renfrew, are constructing for the Hartlepool Harbour Commissioners a powerful steam dredger. The mechanism of this vessel will be similar to the one now cutting the stone bar across the entrance to Carlingford Bay, and to those excavating the great North Sea Channel, Holland.

THE SUEZ CANAL.—The barriers against the passage of water into the Bitter Lakes have been removed and the required level having been obtained along the whole extent of the canal, a steamer, with M. De Lesseps on board, has made the passage direct and without interruption from Port Said to Suez in 15 hours.

STEALING LEAD.—Two men, named respectively Peter O'Brien and Thomas Fogarty, were brought up in custody of Inspector Cullen and Sergt. Warrington, G division, charged with stealing four stone weight of sheet lead from the roof of the house, 20 Lower Mount-street, where one of them had been working for Mr. Lennon, builder, Pembroke street. The officers found the men offering the lead for sale in a marine store dealer's in Denzille-lane, and took them into custody. The case was treated as one of illegal possession, and each prisoner was ordered to pay a fine of 10s., or, in default, to go to prison for seven days.

The Directors of the Alliance and Consumers' Gas Company report very satisfactorily respecting the improvements which are being made, and which are contemplated, for the purpose of diminishing the cost of manufacture and lessening the leakage. The net profit for the half-year is £14,377, against £14,020 last time, and the usual dividend is recommended, at the rate of 7 per cent. per annum.

A BRIDGE 1,000 YARDS IN LENGTH.—M. Boutet, the celebrated engineer, who conceived the project of joining England and France by means of a railway bridge, is on the point of giving a conclusive proof of the practicability of his invention. The experiment, on a small scale, which has already been made at Calais, in presence of some of the administrators and shareholders, has been so complete a success that it will be renewed in a few days in presence of the representatives of the French and English Press. M. Boutet has just returned from St. Malo, between which town and that of St. Servan he intends constructing a bridge of no less than 1,000 yards in length. St. Servan and St. Malo are situated on the banks of the Rame. So constant is the intercourse between the right and left banks, that during 1868 a ferry, which is at work day and night, transported from one shore to the other 35,000 persons. To construct a railway bridge between these localities was a long cherished idea of M. Boutet. Difficulties, however, arose. An ordinary bridge would have impeded navigation. M. Boutet's discovery, however, at once does away with the necessity of piles, and that without in any wise compromising the strength or durability of the bridge. The topography of the country is peculiarly favourable to M. Boutet's designs. This great undertaking will inaugurate a new era in the construction of bridges.

A project has been started for extending the Finn Valley Railway to the town of Donegal, a distance of fifteen miles, and the estimated cost of the undertaking is £60,000.

The railways in the United States open to the end of 1868 were 43,000 miles in length, the cost of construction was £374,000,000 or about £8,698 per mile, and the gross revenue for the year amounted to £80,000,000.

The General Mining Company of Ireland announce that they have completed the erection of works for the manufacture of zinc oxide, and that they are now producing zinc white of great excellence and purity. The works are at Silvermines, Co. Tipperary.

The Hotel and Concert Hall in Grafton-street, for many years in the possession of Mr. Horatio T. Jude, were sold on Thursday to Alderman Pitt, of Wexford. Mr. John Littledale was the auctioneer. The sum realised was £1,600.

The directors of Convict prisons had, we understand, some years ago one of the large wards at Spike Island subdivided into separate cells. The plan has answered so well that all the wards are to be divided in the same manner, and the Board of Works are engaged in fitting up 350 cells, which is being done under the supervision of an officer specially sent down for that purpose.

SCIENCE AND ART.—A striking instance of the immense value a small piece of steel may acquire by the great power of skilled mechanical labour is the balance-spring of a watch. From its extreme fineness and delicacy 4,000 weight not more than one ounce, and exceed in value £1,000. A most interesting little work, describing the rise and progress of watch-making, has been published by J. W. Benson, 25, Old Bond Street, and the City Steam Factory, 58 and 60, Ludgate Hill. The book, which is profusely illustrated, gives a full description of the various kinds of watches and clocks, with their prices. Mr. Benson (who holds the appointment to the Prince of Wales) has also published a pamphlet on Artistic Gold Jewellery, illustrated with the most beautiful designs of Bracelets, Brooches, Earrings, Lockets, &c., &c., suitable for Wedding, Birthday, and other presents. These pamphlets are sent post free for two stamps each, and they cannot be too strongly recommended to those contemplating a purchase, especially to residents in the country or abroad, who are thus enabled to select any article they may require, and have it forwarded with perfect safety.

NOTICE.

THE IRISH BUILDER.

WE would take it as a favor if, when any reference is made to our journal, its proper title, as above, shall be given. When our "Press" friends extract original articles from our columns, they may kindly acknowledge their indebtedness for same by appending "*The Irish Builder.*"

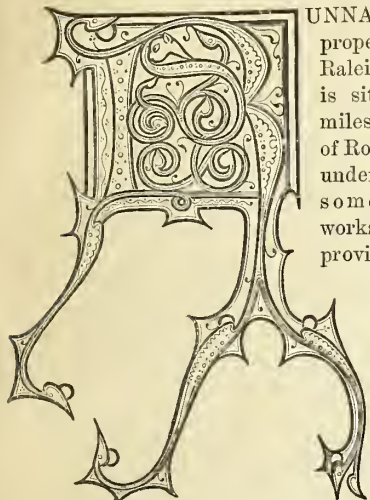
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The Irish Builder.

VOL. XI.—No. 236.

Concrete Building at Runnamoat, Roscommon.



Runnamoat, the property of Colonel Raleigh Chichester, is situated a few miles from the town of Roscommon. We understand that for some time past works of an "improving" nature have been in progress on this estate, and that it is the intention of the present owner to proceed still further. Fencing

draining, and the formation of roads have given large employment to the labourers in the vicinity. These works are being carried on under the directions of Mr. Adams, the land steward, and Mr. Kennedy, surveyor. Most of the land drained up to this time has been deep, black bog, certainly not less than 8 ft. in depth, and in many places much more. Besides the parallel drains and submains there is also a large extent of open cuts into which the mains discharge. These large open drains are 6 ft. to 8 ft. wide at the top. In sinking the parallel drains and submains, before laying the pipes, a cut was made in the bottom rather larger than just sufficient to admit the pipes, having a shoulder on each side, which, after the pipes were laid, supported a sod placed as a covering. This bottom cut prevents any risk of the pipes being displaced. The pipes used were supplied by the Ferguslie Fireclay Works (whose advertisement appears in another column).

Our chief object in this paper is to announce that the new system of building with concrete is being tried at the farm offices at Runnamoat. We have frequently alluded to this material, and its suitability for labourers' dwellings in this country; the only drawback to its use being, in our opinion, the question of cost when compared with stone or brick. Another great difficulty in the way would be in not finding the suitable material contiguous to where the buildings are to be erected.

A contractor (who has already executed several large buildings of concrete), in a communication to the *Builder*, gives us the benefit of his experience. He says:—

"I have learnt so much of concrete with this and other contracts I have taken since, that I find the greatest care must be used in choosing the material. I have made specimens of all kinds. Many persons, and amongst them builders, think if they have gravel, by adding the cement they have all that is required to make concrete. So much depends upon the gravel, that if it is not the right sort the work will cost as much as brickwork, and then never be sound. Every bit of loamy matter and dirt must be washed out thoroughly; then you must replace with clean sharp sand, about one-fourth. Those who wish to build of concrete should only do so where the material is on the spot or very near.

Clean river ballast, with a good proportion of sand, is as good a thing as we can have for Portland cement concrete. If some crushed slag or furnace clinkers can be mixed, so much the better; it is also lighter, which is a good thing in wall construction. Burnt clay is also a very good material, provided it is well burnt. Great care should be taken to sift with a fine sieve all crushed material; for, let it be what it may, dust, loamy matter, or fine sand, if it is finer than the cement itself it will dilute and kill it. I have made specimens of concrete with gravel that have become as hard as the best stock brick, and I have made others, with the same proportion of cement, that you may crush and crumble in your hands."

The system, then, is on its trial at Runnamoat, and we shall be happy to learn that it has proved satisfactory. A notice of this estate appeared lately in the columns of the *Farmers' Gazette*, and below we extract therefrom such portions as touch on the concrete buildings in course of erection there:—

"Col. Chichester's attention having been directed to Mr. Tall's system of constructing walls, houses, &c., in Portland cement concrete, he resolved to adopt it, having fully satisfied himself with regard to its merits, which he was enabled to do from the number of dwelling-houses of all kinds, warehouses, &c., which have been erected on Tall's system in and around London. We may also mention that it has been used in the construction of a large number of houses in Paris, erected under the directions of the Emperor, who takes great interest in the improvement of the dwellings of the working classes.

When we went to Runnamoat we found a dozen of men and lads engaged in erecting a range of houses on one side of a courtyard. These were ordinary labourers, who knew nothing whatever of the system until within five days previous to our visit. The only skilled workman employed was a common carpenter, whose duty consisted in adjusting the framework, or apparatus, when it was necessary to raise it in order to receive another course of the material. The rest were men and boys at a shilling a day, and down to sixpence, according to their capability; and yet, under their hands, the building was progressing as steadily and satisfactorily as if they had been engaged at similar work all their lives. It seemed to come as handy to them as "sodding" potatoes, or cutting turf, which is the kind of work they know most about.

The apparatus is designed to construct 18 inches in height daily over the entire extent in hand. What is done in the evening of one day is as hard as granite next morning, and quite strong, the best proof of which is, that the wall itself, as it rises in height, supports the necessary scaffolds, as shown in the engraving on another page. In order to test the strength of the wall, sixteen persons were put to stand on the scaffold supported by a part of the wall erected the previous day. The walls are only 9 inches thick; but walls of that thickness, constructed of concrete, are stronger than brick walls double the thickness. It is difficult, in fact, to convey a full idea of the extraordinary strength of concrete, as made on Tall's system; but we may mention that Mr. Tall exhibited at a meeting of the Architectural Association in 1866 a block of concrete, 3 ft. in length, 11 in. deep, and 4½ in. thick. That block was placed on a frame having a bearing of only about half an inch at each end, and a scale was suspended by a chain passing over the centre of the block. The scale was loaded with iron weights, until 1 ton 16 cwt. (all the weights at hand) were suspended from the block without breaking it. This fact will convey some idea of the strength of the material, which, as used at Runnamoat, consists of one part of Portland cement to eight parts of coarse gravel. The cement and gravel are first well mixed together in a dry state, and when this is done it is damped by means of a large watering pot, and again mixed by a pronged drag, such as we use for

dragging dung out of a cart, until the entire heap has been wetted and mixed together. It is then put in iron or zinc pails, and poured into the frame, where it is levelled by men stationed for the purpose. In order to save concrete, large lumps of stones or brickbats are put into the centre of the wall, and covered over and about with concrete. Frost does not affect the concrete after it has once set, which, with good cement, will be in about five or six hours. Nor do heavy rains appear to injure it in the slightest degree, of which we had ample proof. In about four or five hours after the men dropped work on the evening we were at Runnamoat it began to rain very heavily, and continued so without intermission for upwards of ten hours, but when we examined the walls after the rain ceased, we found that the concrete which we had seen put in on the previous evening had become perfectly hard. The walls are straight and even as it is possible for walls to be, and the corners as sharp and neat as if they had been formed of the most carefully dressed stone.

Concrete makes excellent floors, and the walls and floors are quite impervious to vermin of all kinds and also to wet. Many kinds of building bricks will absorb as much as a pint of water each; hence, brick houses, when the walls are saturated with water, are cold. This is not the case with houses constructed of concrete, as it is non-absorbent of moisture, and such houses must be, therefore, more healthy.

This novel mode of building houses has excited great interest in the neighbourhood of Runnamoat, and the proceedings have daily attracted numbers of people from all parts. Mr. McOwen, a local builder, has charge of the work, and having been instructed by a gentleman sent over by Mr. Tall, is now perfectly competent to carry it on without further assistance. As it is more than probable that others will be inclined to adopt concrete in building houses, Mr. McOwen expects he will find ample employment once the stabling at Runnamoat is completed.

While concrete may be used in constructing buildings of every description, it is peculiarly adapted, from its cheapness, for the construction of cottages for labourers, and also for farm buildings. Its cost is not more than half that of brickwork; almost any material can be used along with the cement, and, as we have already shown, the most ordinary class of country labourers are quite competent to carry out the details of the system. With reference to its adaptability for large buildings, we may mention that a warehouse 70 ft. long, 50 ft. wide, and 60 ft. high, five storeys in all, has been erected on Mr. Tall's system for Mr. H. Goodwin, Great Guildford-street, Southwark, and the following letter from Mr. Goodwin dated August 6th, 1869, will show how successful this plan of building has been in such cases:—

SIR,—Having now so successfully erected and let the concrete warehouse, at the above address, which is at the present loaded with hops, I have much pleasure in testifying to the great efficiency and simplicity with which the whole of the concrete construction is carried out by the aid of your valuable building machine.

I may here state that your apparatus was put to a severe test for rigidity and strength in the erection of this warehouse, some of the walls up to the second floor being 2 ft. 3 in. thick, and the whole of the work throughout has been carried up both in level and perpendicular within ⅜ of an inch, a most important feature in this class of building, when it is known that small cottages erected with an inferior class of machine have been as much as 2 in. out of upright. It is very gratifying for me to know that this warehouse is universally admired by all practical and scientific gentlemen who have watched its progress and completion. Its great success is such that I am at the present time making arrangements for erecting another of the same class, and I have also just completed the erection of a concrete chapel at Snaresbrook, and villas at Croydon, also thousands of feet of walling, 9 ft. and 12 ft. high, 9 in. thick, without piers, and am just commencing two houses in Broadwall, Blackfriars-road, all with the same machine which you supplied to me. I am also open to contract for any amount of building in concrete. You are at liberty to make any use you please of this letter.

H. GOODWIN.

ARCHITECTURE AS A POPULAR STUDY.*

ARCHITECTURE is too much overlooked by us as a study. There is no science which is forced so much upon our attention; no science which pleases us so much, even although we do not understand it; no science of which it is easier to learn something; no science which carries us further back in the world's history, and presents such a vivid picture of the manners and customs of nations, that would otherwise have been buried out of sight and remembrance; and yet as an accomplishment it is the least chosen of any. All the arts and sciences are useful in civilizing and enlightening a nation, but we question whether any is more useful than architecture. We can fancy a nation having wonderful architectural structures (like Great Britain in the thirteenth century), with little knowledge of poetry, philosophy, or astronomy; but we could not imagine a nation learned in all these sciences living in huts and wigwams. It is necessary for the well-being of the other arts and sciences. It is also useful in being the best means by which a nation can record its greatness, and hand it down to future generations and ages. As Ruskin says, "How cold is all history, how lifeless is all imagery to that which a living nation writes and uncorrupted marble bears! how many pages of doubtful record might we not spare for a few stones left one upon another!" One of the deepest feelings implanted in man is that of wishing his name to be remembered after he is passed away. Akin to that is a patriotic feeling, desiring that his country may long be preserved, and his name, actions, and acquirements remembered to the world's end. What, then, is to accomplish this latter desire? Is it the poetry, the philosophy, or the manufacturing skill of a nation that is to do it? No! Let us wander down the banks of the sacred Nile to the interesting land of the Pharaohs, and whom do we find there as representative of the greatest nation in old-world history? A few wandering Arabs living in tents, and surrounded by cattle, with no architecture, no literature, no art, no science, and who expect to reach heaven through the narrow gates of Mecca. Let us ask them for the language, the religion, and the literature of the ancient possessors of the soil, and the only answer we obtain is a movement of their finger towards some colossal ruins in the neighbourhood, signifying that the architecture of the Egyptians alone is left a witness to their greatness. Yet it is sufficient. Go into the Hypostyle Hall of Karnac at Thebes, and wander among its groves of massive and gigantic pillars, sculptured with figures and hieroglyphics from top to bottom, along whose innumerable vistas we gaze in wonder and awe, till the gradually-receding columns are lost in a gloomy obscurity. The number and magnitude of the buildings show us the Egyptians' power and wealth; the images and bas-reliefs of their religion and ceremonies; the carvings and details of their culture and taste; the precision with which each joint is fitted, of their skill and workmanship; and in the great size of the materials, and the strong and almost imperishable manner in which they are put together, we perceive that they, more than any other nation that ever existed, were possessed of the desire to live for ever in history, so that all nations of the earth might behold and reverence their greatness and power.

We read in Spanish history how Cortez invaded Central America, and destroyed many great cities and magnificent buildings occupied by a highly-civilized and intelligent people; but the present degraded Indians of that country, living in huts, can tell us nothing of their ancestors, nor do they preserve any books or traditions regarding them. It is only by examining their ruinous and forest-hidden cities, discovered only a few years ago, that we can prove the truth of the Spanish historians, and only by reading these stone

books of the nation that we can determine their position in the scale of civilization, their knowledge, their power, and their religion.

A few years ago a traveller was threading his way through an almost impenetrable and uninhabitable jungle in Cambodia, Siam, when, through an opening in the trees, there burst upon his astonished vision the massive wall of an old deserted city. Entering therein he discovered, among other buildings, a magnificent temple, rich in ornament, beautiful in style, and grand in design. Long shady corridors ran round the outside, constructed better than modern works of a similar nature. The pillars were ornamented with the most exquisite mouldings and carvings, and the walls were enriched with the most graceful bas-reliefs, depicting the people in one long procession, the ladies in magnificent attire, and the men carrying swords and spears of apparently beautiful workmanship, or driving in wheeled carriages of elegant design, the whole demonstrating to the astonished gaze of the traveller that a powerful, wealthy, and highly-accomplished nation, whom Europeans had never heard of before, once occupied these ruins; that about those streets people bustled in a busy stream of life, where now all was solitude and desolation; and in that temple, where the voices of thousands joined in a universal song of praise, the serpent and the tiger now made their abode. Thus do we find, and in many more instances besides those we have mentioned, when a nation has been swept off the earth, or sunk into barbarism, when its descendants possess no trace of their ancient history, and no traditions of their ancient glory, when their books have been destroyed, and all the other knowledge and skill that they possessed have failed to witness to their greatness, that architecture, like a faithful sentinel, has stood by it in its centuries of neglect and danger, brought it out of the mist and obscurity with which it had long been veiled, and placed it in its proper rank among the nations of the earth.

Architecture is the one language which every nation can read and understand. People point to literature, and say that there is an influence which reaches from the highest to the lowest, but its universal influence is cramped by languages; to painting, but by its scarcity it influences only the wealthy and the educated; to individual religions, but their influence passes away with the nations that adopt them. Books may be written, yet we are not forced to read them; pictures may be painted, yet we are not forced to look at them; sermons may be preached, yet we are not forced to hear them; but architectural buildings cannot be erected in our midst without our regarding their appearance and meaning, and there they will stand, coloured by hoary age, exerting an ever-present influence over future generations when the name of the builder has been lost in oblivion. People may, without thinking, deny the intellectual influence of architecture, but what a man sees every day has as much influence on his mind and feelings as the meat he daily eats has over his body.

Architecture has an ennobling and refreshing influence on our minds as the advance of spring and summer has on our bodies, accomplished also in as gradual and imperceptible a manner. For whatever attracts attention by its goodness and beauty suggests thought and causes research, and is accordingly a most beneficial and powerful instrument for improvement. The nobler the feelings also that are aroused the greater is the pleasure.

In travelling, a knowledge of architecture is invaluable. In visiting a foreign country, and entering their cities, every one takes most interest in that which illustrates or teaches him more regarding his special study or hobby. The student ransacks the libraries for ancient classical lore. The artist lives in the picture galleries, admiring and studying their contents. The antiquary frequents the museum, and patiently treads his way through narrow, dirty streets, seeking for old buildings. The geologist, like Hugh Miller,

wanders to the churchyard, and there discovering a fossil in a stone, passes away hours in looking at it, investigating the causes of its appearance there, musing over the story that it tells, and noting the lessons that it teaches. The merchant examines the shops and stores. The man of pleasure frequents the restaurants, the billiard-rooms, and the theatres. But one and all make a point of examining the principal churches and public buildings. Yet though they see the structures they do not understand them, nor can they comprehend their full meaning. They are as much understood as a starry sky is by one who does not know astronomy, or a collection of wild flowers by one who is ignorant of botany.

THE SURVEY OF INDIA.

THE recent appointment of Mr. Hunter, the author of "The Rural Annals of Bengal," and a distinguished member of the Indian Civil Service, to compile a Gazetteer, primarily of the Bengal Presidency, and, eventually, of all India, will naturally have attracted attention to the nature of the materials at his disposal. Foremost among these, and but little available at the time of the compilation of Mr. Thornton's well-known Gazetteer, are the results of the labours of the Indian Survey Department. These have been carried on for many years past, in spite of every obstacle; of the hostility, avowed or concealed, of almost every native chief whose territories have been entered for the purpose; of entire want of appreciation on the part, not only of the English, but of the Indian public, and of the scant encouragement at the hands of the Government of India. So far, indeed, as this country is concerned, it is scarcely too much to say that the majority, even of persons who profess an interest in India, are scarcely aware of the existence of a department whose work is habitually utilised, and highly rated, by every continental geographer who can claim the most ordinary acquaintance with his subject.

We think we shall be rendering, at the present moment, good service, by calling attention to the important geographical results which are due to the Indian Survey, as carried on under its present able superintendent, Colonel Thuillier, of the Artillery.

It is superfluous to state that, in a vast country like India, comprising 1,367,200 square miles, the work of the survey is of a very different character from that (with which many of our readers are probably familiar) of the Ordnance Survey of England.

The department is divided into three branches. The Trigonometrical, which, starting from, and closing on, a measured base, assigns definite positions to certain selected places throughout the country, with the greatest accuracy which modern instruments are capable of attaining; in other words, without appreciable error. The recent rapid progress of this most valuable survey—valuable not only to the country actually traversed, but indispensable also to a proper physical delineation of the vast continent of Asia, is in great part due to the present able head of this branch, Colonel Walker, R.E.

On the basis of the data thus arrived at are founded the operations of the two other branches: the Revenue, and Topographical. The Revenue Survey, taking up those of the country, to which, owing either to the great fertility of the territory, to the political necessity of the precise definition of its limits, or to other causes, special importance is attached, proceeds on a much more minute system, noting, on the large scale of four inches to the mile, the boundaries not only of the various independent States, but also of the individual Jagheers and village holdings; nor can it be necessary to indicate to our readers of what infinite value such an accurate and authoritative demarcation must be in a country in which the possession of land is the primary emblem, and, indeed, the chief element of dignity and prosperity. It is obvious that the expense of the delicate and difficult operations by which so desirable

* From a paper by Mr. A. Dewar, read before the Halifax Literary Society, Nova Scotia. Extracted from the *Builder*.

an adjustment or avoidance of endless boundary disputes is attained, must materially differ in different parts of the country. But we think our readers will agree with us in regarding the average cost, which may safely be stated at 80s. and 90s. the square mile, as extremely moderate for a work so essential to the peace and prosperity of the country.

The Topographical branch, on the other hand, deals with those districts which, whether owing to their mountainous character, the absence of water, or the prevalence of impenetrable jungle, are, in a revenue point of view, not worth the expense of a survey on so large a scale as that above indicated. Into this branch, therefore, fall all those Native States which are not under our own immediate management, or do not directly pay revenue into the British Treasury. For these it is in most cases sufficient to have a survey on a scale adequate to all possible military exigencies. This has been fixed at an inch to the British mile; special surveys being of course made, on a very much larger scale, of all forts in European, and, as far as possible, of those also in native hands; of all cantonments and other military positions. The cost of this survey is rather less than half of that previously referred to.

Until within the last two or three years the general public derived little or no benefit from the labours of the department. The only maps which it was possible to procure were on a comparatively small scale, and could be obtained only at very considerable expense. It is, therefore, a subject of congratulation that the new processes of photolithography and photozincography have without delay been made available for the rapid and inexpensive reproduction of maps; and it redounds much to the credit of the head-quarter offices at Calcutta and Deyra that the demands of the Government and the public can be supplied with such rapidity, that facsimiles of the surveyors' field-sheets are available for Government service or for sale within a few days of their reception at the office; and the magnitude of the work which this rapid production entails may be estimated by the fact that, in Calcutta alone, nearly 100,000 copies of maps were struck off during the last official year.—*Broad Arrow.*

THE SUN'S "GLORY."

THE conclusions of the American astronomers as to the nature of the brilliant protuberances and the aureole which surround the sun on the occasions when it is eclipsed are not allowed to pass unquestioned by French *savants*. At the last meeting of the Académie des Sciences, M. Faye called the attention of the members to the results of the observations made on the occasion of the last eclipse. He said that M. l'Abbé Moigne had placed the photographs of the sun taken by the American mission at his disposal. After remarking on the peculiar appearances presented by the protuberances, one of which he likened to the masses of vapour that are sometimes seen floating over water, another to a whale with an enormous tail, he said of the latter:—"This protuberance was 70,000 miles in length; its total volume, making all allowances, would be 50,880,000,000 cubical miles." As these protuberances could now be examined at leisure, the chief interest was centred in the golden ring which surrounds the black disc of the moon during an eclipse. Professor Young's conjecture that the brilliant rays which constitute this ring are a permanent aurora borealis, the result of incessant electrical discharges similar to those seen in the Arctic regions, is disputed by M. Faye, who thinks the conclusion is not warranted by what is known of the constitution of the sun. As for Mr. Pickering's statement that the solar crown gave no trace of polarization, the same learned *savant*, who has made the sun his peculiar study for many years past, conceives that Mr. Pickering is mistaken in his opinion on this matter, and he brings in support of the opposite supposition (for it is difficult to call it by any other name when

the contradiction between scientific observers is so absolute) the observations made by M. Mauvais in 1852, and by M. Prozmowski in 1860. It is asserted, apparently for the purpose of explaining how Mr. Pickering fell into the error imputed to him, if error it be, that he used an instrument for making his observations which destroyed the polarization. Seemingly with the view of appeasing any pain that the discussion might cause to the susceptibilities of the American observers, they are congratulated on having enriched science with photographs of fleeting phenomena most valuable for present study and future comparison.

NEW FREE SCHOOLS, COLERAINE.

THE handsome and commodious school buildings erected by the Hon. the Irish Society, in Beresford-place, Coleraine, have been opened by the Society's agent, Walter Green, Esq., J.P. The buildings comprise four sections—boys', girls', and infants' schools, besides residence for the head master. In external appearance they are remarkably attractive; the removal of the old school premises having contributed materially thereto. Internally, nothing could be more commodious, and even elegant, whilst every minor detail which would strictly carry out the primary purpose of the liberal founders, has been carefully considered. The school-rooms (with the class-rooms adjoining) are capable of accommodating 200 children in each. Particular attention has been given to the lighting and ventilation, which have, so far, proved satisfactory. Messrs. Turner and Williamson were the architects, and Messrs. J. and R. Ferguson, Pump-street, Derry, the contractors. The cost was about £5,000.

THE NEW HARBOUR AND DOCKS IN TABLE BAY.

FOR many years past the necessity of improving upon the natural advantages offered by Cape Town as a port of call has presented itself to those interested in the welfare of the town and colony. Nearly a century since, the Dutch, with characteristic enterprise, contemplated the construction of a gigantic breakwater, seven miles in length, which should connect Robben Island with the mainland, and since then various schemes for harbour works have been projected from time to time. Not until 1860, however, were any practical steps taken in the matter; in that year the colonial Legislature passed an Act authorising the construction of an extensive scheme of harbour works. These works were designed by Mr. Coode, C.E., and have been carried out under the superintendence of Mr. A. T. Andrews, C.E., the resident engineer in the colony. They consist of a breakwater extending from the shore in an north-eastern direction for about 2,000 ft., enclosing a sheltered area of over 1,100 acres. Next there is an outer basin of 6 acres low water area, and connected with it an inner basin of 10 acres, with 30 ft. of water when the tide is in, and 24 ft. at low spring tides. A graving dock 400 ft. in length, and 90 ft. in width at coping level, and 35 ft. on the floor, forms part of the general design, but has not yet been constructed. The breakwater or mole is constructed of blocks of stone which were taken from the adjacent dock excavations and deposited on the "*pierre perdue*" system. The top of the breakwater is 30 ft. in width at a level of 11 ft. above high water. The slope to seaward is 5 to 1 from the crest of the bank down to 15 ft. under low water; below this it is 1½ to 1. On the inner side the slope is 2 to 1 and 1½ to 1.

The outer basin is formed by two jetties of creosoted timber; piles 14 in. square are placed in bays at intervals of 10 ft., and

secured by intermediate piles of 2 ft. 8 in. apart driven into the clay bottom. The top of the planking is 10 ft. above high water level. The outer basin was excavated in the rock, and during the progress of the work the water was excluded by means of a cofferdam, which was placed across the entrance. This cofferdam—which rested on the rock bottom in 12 ft. of water at low water spring tides—was formed by uprights of 2½ in. round iron rods lewised into the rock. Inside these rods 4½ in. planking was made fast by stirrup bolts, whilst outside towards the sea was a puddle hearting 6 ft. in thickness, protected by a wall of concrete blocks 7 ft. in thickness. Timber struts placed on the inside of the planking made the whole secure.

There is a patent slip in connection with the inner basin, which is adapted for the repairs of the largest class of shipping. The total length of quays in the dock is 2,500 ft., and in the basin and along the jetties 1,400 ft. Ample provision has also been made for wharfage purposes and the erection of warehouses. The inner basin was constructed under somewhat peculiar circumstances, the excavations having been made almost entirely in the solid rock, involving the removal of upwards of a million tons of stone. This afforded a constant supply of material for the breakwater, and by taking advantage of the nearly perpendicular beds of schistose rock the labour of constructing the wharf walling has been reduced to a minimum. In effect the quarry ground has been converted into a floating dock. The economy of the work has been further improved upon by the employment of convict labour both in the excavation of the dock and the construction of the breakwater. The method adopted in forming the breakwater was decided upon in order to obviate to a great extent the employment of skilled artisans, and to enable the labour of about 600 colonial convicts to be utilised to the fullest extent. It will be seen from what we have stated that the project is comprehensive, and well calculated to meet all the requirements of the port. The works were commenced on the 17th of September, 1860, and the whole, with the exception of the graving dock and a portion of the outer end of the breakwater, are now completed. Water was fully admitted into the inner basin on the 21st of August last, to the great satisfaction of the colonists. For the purpose of admitting the water, holes were drilled through the rock forming the base of the cofferdam, which was also excavated. About noon on the 19th, after several blasts had been fired, a leak made its appearance on the inner side of the cofferdam, and in the course of the night the flow of water increased. From an early hour on the 20th up to the middle of the day the water rose at the rate of about six inches per hour. The rise continued to increase until at daylight on the morning of the 21st the dock was filled to its full depth. Up to the present time about £345,000 has been expended upon this undertaking, which will stimulate the trade of the Cape Colony and prove highly beneficial to the commercial enterprise of the whole of the western portion of South Africa.

A CONTEMPORARY'S "CORRESPONDENCE."

AN *Architect's Student* is favored with space in a contemporary to say that he "would feel much obliged if any of your architect practitioners would kindly inform me of the best style of constructing an ORANGE HALL, the number of rooms, and names of such; largest room to be used as lecture-room, &c., occasionally; building to cost about £1,800, free of ground rent, &c." We recommend the above to the attention of our professional "brethren" in the North, amongst whom no doubt there will be found many who will be happy to oblige a very modest "*Architect's Student*."

BALLYCRAIGY MANOR, ANTRIM.

THIS week we give an illustration of Ballycraigy Manor, near Antrim, the residence of James Chaine, Esq., J.P., which is at present undergoing extensive alterations and enlargements. The front of the old structure, now forming the left wing of the new building, and which was originally of Italian design of the plainest character, is being recast, as shown in the view.

The right wing, which is entirely new, covers an area of about thirty-six squares, and provides the following accommodation:—A principal staircase, 30 ft. by 27 ft., with wine cellars underneath; dining-room, 30 ft. by 24 ft., with serving-room, 13 ft. by 13 ft., adjoining; billiard-room, 30 ft. by 20 ft.; smoking-room, 19 ft. by 16 ft.; fire-proof plate closet in tower, and three large bed-rooms on ground floor, and on first floor seven large bed-rooms, &c.

The style of the building is Castellated Tudor, and the materials used in the building are local.

The contract for the works has been taken by Messrs. Thomas Dixon and Co., builders; and the architect is Mr. W. Redfern Kelly, C.E., Belfast.

THE NORTHERN BANK, BELFAST.

THE interior of this building has just been painted, and to a certain extent decorated, by Mr. A. Moore, of Arthur-street, Belfast, who has thereby succeeded in an admirable manner in producing an additional example of his taste and skill as a decorative painter, and proved that the architects of Belfast have at their own doors the artistic taste as well as manipulative skill necessary to realize their requirements in this important branch of their professional practice. Entering the bank by the vestibule we have in the panelled walls some excellent imitations of red granite and verd-antique white, the panelled ceiling having pale blue panels and cream-coloured styles. The cash office is a large, spacious apartment, having detached Doric columns from the walls, and supporting a rich cornice, &c., from which the coved ceiling springs to support a flat coffered central portion. The room is lighted by windows piercing the coving over the main cornice. The various doors occupy the intercolumnar spaces, and are flanked by pilasters supporting a sub-entablature below the main one. While the colouring is rich and varied, it is treated in strict subordination to the architectural features, and greatly enhances rather than mars their effect. The deep rich tints of the imperial red marbles of the pedestals graduate upwards by the cool marble pilasters to the delicate tinting of the coffered ceiling. All the plain portions of the walls and ceilings are in different shades of pure rich cream-colour, while the architectural enrichments are skillfully treated with more positive colour. The main columns stand out excellent examples of Sienna marble. The entablature is chiefly in tints of cream-colours, the mutules and patera of the soffite being picked out in green and buff, with crimson and mauve background. The dentils are effectively picked out in crimson and green, while the triglyphs are decorated in tints of pink and green. The coved portion of the ceiling is plain cream-colour, only that the rope moulding on the rib at the intersection of the arches is tinted crimson and green. The panelled jambs and soffite of windows have tints of citron and mauve, the mould-

ings being russet. The panels of the coffered ceiling are in suitable tints of fawn and mauve, the enriched mouldings being picked out in green, orange, and pink. The large centre and patera are finished in gold bronze. And thus, while there is a free use of colour, it is so arranged, graduated, and combined as to secure a subdued effect and an air of simple elegance, in pleasing contrast to the gaudy, obtrusive glare of incongruous colouring so frequently put forward as decorative painting.

THE LATE PROFESSOR BEETE
JUKES, M.A., F.R.S.

It may be remembered (says the *Colliery Guardian*) that at a recent meeting of the South Midland Institute of Mining, Civil and Mechanical Engineers, held in Wolverhampton, Professor Beckett, the president, alluding to the death of the late Professor Jukes, said he was a very moderate man in drinking, and he (Mr. Beckett) believed that if their late friend had not given way to the unfortunate habit of smoking he would have lived for many years to come. The following letter on the subject has been written by Mr. Jukes's widow:—

72, Upper Leeson-street, Dublin,
October 4th, 1869.

SIR,—I am surprised and grieved to find that Mr. Beckett, when speaking of my late husband, Prof. Beete Jukes, attributed his death to smoking. When he returned from Australia, and for a few years afterwards, he smoked certainly, but never to excess, and for the last fifteen years of his life he never touched tobacco in any form. His premature death was, I believe, attributed to a fall he had in 1864, whilst on duty in the south of Ireland, which caused concussion of the brain, and his extreme anxiety and conscientiousness respecting his duties to the service to which he was attached prevented his taking the required rest of mind and body to ensure his recovery, and he gradually sank from the effects of overwork.

GEORGINA AUGUSTA JUKES.

WORKMEN'S INTERNATIONAL
EXHIBITION, 1870.

On Saturday evening a meeting of the Belfast Working Men's Committee in connexion with the International Exhibition to be held in the Agricultural Hall, London, next year, was held in the Oddfellows' Hall, Academy-street, at half-past six o'clock—Mr. Daniel Pettigrew in the chair.

The chairman congratulated the meeting on the large attendance of representatives of the various trades, and said he trusted they would not relax in the work undertaken until they embraced every trade and calling in the town and neighbourhood, and that all would be creditably represented not only at the Local Exhibition, to be held under the auspices of his Worship the Mayor (Fredk. Harry Lewis, Esq.), but also at the London Exhibition, where they would compete with all the countries of the world. Since their last meeting, the deputation appointed to wait on employers, asking them to place the facilities of their establishments at the disposal of workmen intending to produce articles for the Exhibition, had got over a considerable portion of the work deputed to them, and he would call on the secretary to give a report of what had been already accomplished by the deputation.

The secretary (Mr. Wm. Kirkpatrick) said the deputation had waited on some of the principal employers in town, and by all of them they had been favourably received. Several of the foundry proprietors, the principals of Oldpark and Clonard printworks, and some of the large linenhouses, had promised to give every facility to workmen in their employment who may express a desire to produce articles for the Exhibition. As only a part of the duties of the deputation had yet been accomplished, the report was necessarily imperfect, but on the next night of meeting he (the secretary) hoped to be in a position to place before them a gratifying report.

The secretary then read a letter from the

British Consul in Copenhagen to the Earl of Clarendon, which had been handed over to the Council of the Exhibition in London, in which he stated that the announcement of the proposed Exhibition had been received with much pleasure in Denmark, and that valuable contributions were likely to be made to it by Danish exhibitors, for it had been settled that a somewhat similar Exhibition should be opened in Copenhagen in 1870, but quite recently local difficulties had supervened, and the scheme was postponed, if not definitely abandoned; the energy and capital, therefore, that would have been expended in supplying the Danish undertaking, would now without loss to national industry or pride be diverted to the English International Exhibition.

The secretary also read a letter from the London Council, containing valuable suggestions to local committees, of which the following is an extract:—

"No exhibition can be of a useful or instructive character if it consists mainly of articles of second-rate workmanship, which display neither manipulative skill, nor thought and invention as to the purposes for which the object is intended, nor a cultivated study of what is beautiful. Especially are models of common objects, possessing neither beauty, interest, nor instruction, and executed in unsuitable materials, to be avoided. In order that workmen may produce articles of the best workmanship, we would suggest that they should observe as much as possible the subdivision of work which exists naturally in their own trade, and in combining together to produce one article that each part of the article should be executed by the workman whose daily occupation is the manufacture of that particular part. To produce articles for exhibition in such a manner would generally require the assistance of the workman's employer, in allowing to the workman the use of machinery, &c. Where this assistance cannot be obtained, we would suggest to the workman to purchase the article, if of a simple and inexpensive character, in the unfinished state, in which it would ordinarily reach his hand, and to exhibit it, after having applied his labour to it, as an illustration of his particular subdivision of work; or we would suggest that he should himself select some method of showing his skill in his particular occupation, which would be of a more simple and less expensive character than the completed article itself. Such test specimens would not only call out the highest power of workmanship, but would also instruct the purchasing public as to what are the special excellencies for which they should look in an article offered for sale. Any number of instances may be given; thus, a glass-cutter might purchase the plain decanter or wine-glass; the fitter might purchase the rough casting; the finisher of a watch, the various parts as manufactured by machinery, each exhibiting the article with his own labour added to it. It would in some cases increase the interest of the exhibition if the exhibitor were to place by the side of the article he exhibits the same article in the earlier stage of its manufacture, as it came into his hands to receive his labour. Again, where a workman wishes to show his skill without the expense of exhibiting the completed article, if a cabinetmaker, he might exhibit a piece of inlaid work, or a specimen of dovetailing; if an engineer, two perfectly smooth surfaces, or a rod and cylinder of perfect accuracy, &c. We will only add that, without detracting from the value of productions by amateurs, on which great skill and patience are often spent in leisure hours, the more important object seems to be to develop the skill of the artisan in his own trade, or branch of trade, and to bring together the best results of experienced labour from all countries."

It was suggested that the linen houses be asked to get up a linen trophy for the exhibition similar to that forwarded to the last London and Paris Exhibitions. The secretary was instructed to write to the proprietors or managers of some of the large establishments, asking liberty for a deputation from the committee to meet their employes for a short time, after the hours of business, in order to lay before them the objects of the exhibition. Additional names were added to the committee, and a money club—to enable parties, by paying a weekly instalment, to visit the exhibition—commenced, of which Mr. John Hagan was appointed treasurer. It was decided to continue the meetings of the committee every Saturday evening at half-past six o'clock, in the Oddfellows' Hall, so that workmen may have an opportunity of receiving information with regard to the Exhibition.—*Whig*.

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The Irish Builder.



BALLYCRAIGY MANOR. IS THE RESIDENCE OF JAMES

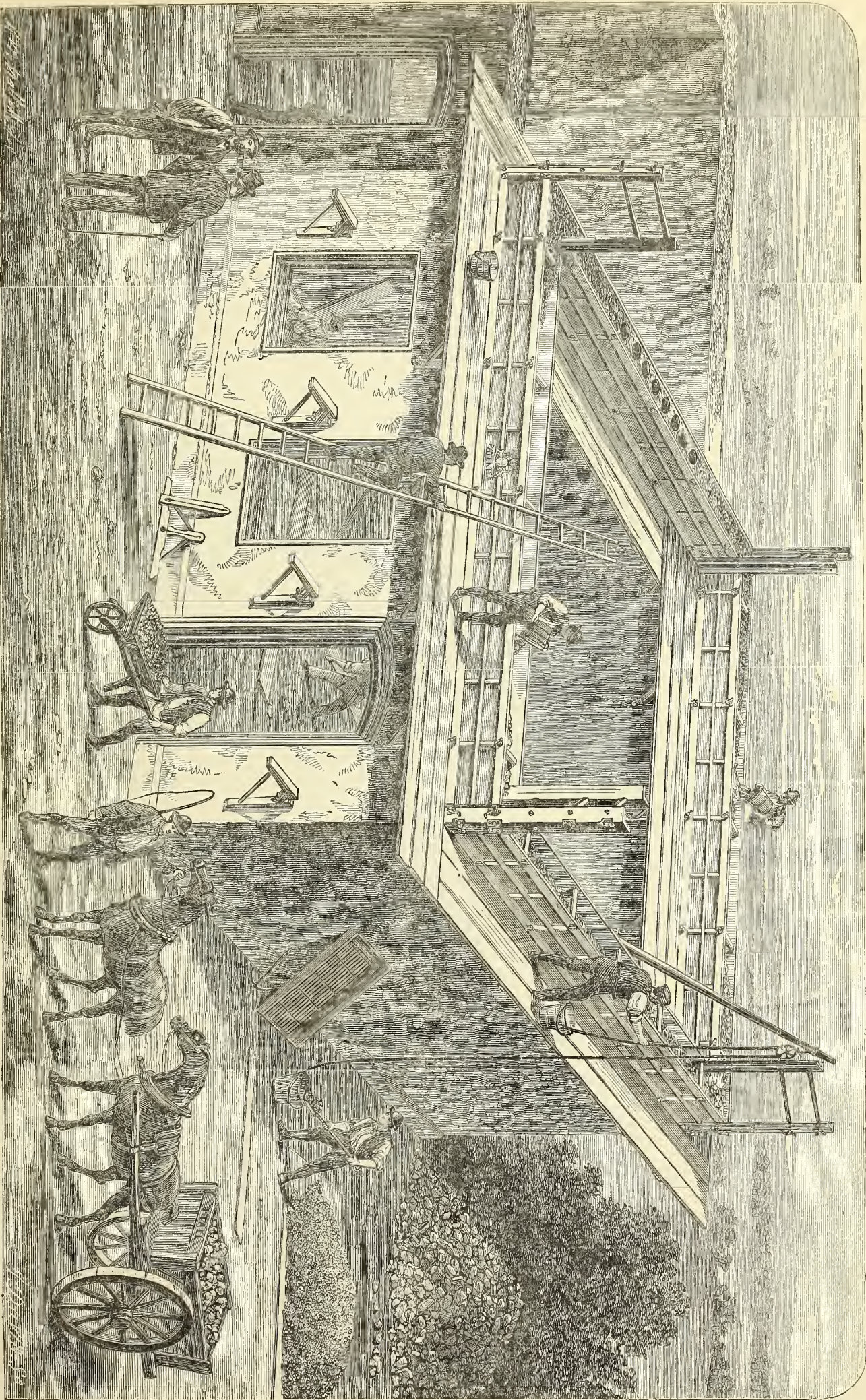
John Lyon & Co. Builders.

No 256. Oct. 15th 1869.



CHAMBERLAIN. ESQ. CO. HUNTER. WM. PEDERSEN. NELLY. Archt.

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CONCRETE BUILDING—TAILS PATENT.

A STREET OF HOUSES PULLED DOWN IN BELFAST.

On Wednesday morning, between twelve and one o'clock, the inhabitants of Byron-street, Oldpark-road, and neighbourhood were alarmed by a sudden report resembling thunder or the discharge of a battery of artillery. Hasty preparations were made for a retreat from the locality, and many people, in the first paroxysm of the panic, rushed out in every stage of the toilet. It was ascertained that the cause of the alarm was the total demolition of a street of new houses, fortunately as yet not occupied. Doors, windows, bricks, &c., all lay in one heap of ruin. Where, the previous night, a row of partly completed dwelling-houses stood, there was now a pile of rubbish and debris. The mystery was subsequently cleared by the production at the police-court of a man named Clarke, who, with a number of other men, was found by two constables, immediately after the fall of the buildings, concealed in the immediate vicinity. The finding about the premises of a number of strong ropes, like ships' hawsers, leads to the supposition that the mischief was done by passing the ropes round the narrow walls between the lower windows underneath, and "a long pull, a strong pull, and a pull altogether" did the rest. From early morning till late at night the scene of the occurrence was visited by crowds of people to see the result of this extraordinary freak. Eleven houses in one row have been completely demolished; and it was also found that, in another line of buildings behind, the interior walls had likewise been pulled down.

CORRESPONDENCE.

[It is to be distinctly understood that although we give place to letters of correspondents, we do not subscribe editorially to the opinions or statements set forth in same.]

LAND TENURE.

TO THE EDITOR OF THE IRISH BUILDER.

SIR,—In your issue of the 15th ult. I saw a letter from Mr. Haughton on the above subject, and I consider his plan of settlement fair and just; but Mr. Haughton will see by this time that such a settlement as he proposes is likely to meet with but little favour from the parties most actively engaged in the question. The leaders of the people have thought well to insist on *fixity of tenure*, and wish to secure this end by means very different from that suggested by Mr. Haughton. Now, for my part, I cannot see how Government can grant *fixity of tenure* in this sense without largely compensating the landowners. Let us suppose, for example, that a capitalist were possessed of £60,000, and that with £20,000 of this sum he purchased land, that he bought a flour mill with £20,000, and that the remaining £20,000 he lent out at interest; saying then that he rented the mill and the land, and that from each of these three sources he received an annual profit of 5 per cent. If it were possible that Government could take this land and hand it over to the party to whom it was rented and to his children for ever so long as they paid the rent, could not Government in like manner take the mill and give it to the party to whom it was rented? and the £20,000 given in loan would be passed from the possession of the capitalist to that of the borrower so long as the latter paid the interest. It is evident that in any or all of the foregoing cases Government would be taking the right of possession from the capitalist, and that he would have to be compensated for the loss of this right. He bought his land with the right of renting it to the highest bidder, and if this power over it is lost, the land will of necessity decrease in its selling value, and Government will have to compensate this decrease. The questions then arise—Who is to value this decrease, and where is the money to come from to compensate the landlords? Indeed, I fear, the latter question will put it beyond the power of the legislature to settle. If it be for the benefit of the country that the tenant should

have *fixity of tenure*, the simplest plan seems to be that Government buy the land from the present owners, and then sell or rent it, as the case might be, to the tenants. Of course some people will say, that if the land were sold there is nothing to hinder it from going back into the hands of the large owners, and if it were rented the people might not find Government much less strict than the present landlords; and that Government might find that though the character of the landowner has been changed, that of the tenant has not. The pith of the question seems to be how the tenant is to be enriched at no one's expense. I do not write this with any party interest, but I simply wish to know how it is possible to justify *fixity of tenure* without compensation; or, if compensation is agreed to, in what way is it expected that Government would provide for its payment?

DIOGENES.

THE ROUND TOWERS.

TO THE EDITOR OF THE IRISH BUILDER.

SIR,—The writer of the last effusion confounds assertion with proof, accepts supposition as argument, and rambles from the point into a maze of architectural disquisition foreign to the subject altogether. In the compass of a nutshell he jumps illogically from one conclusion to another, without entertaining a single argument. Any one who has read Dr. Petrie's essay must detect in this display of architectural knowledge the source from whence it is derived; the self-same ideas, eye and language, have been used by the doctor to sustain the Christian origin. We have had enough of the "arch," grotesque capital, and Saxon analogy. Dr. Petrie has said as much as can be written on the subject, and until new light is thrown on it by scholars deserving of recognition, mere theorising novices who only superficially study the antiquities of our country, must fail to reverse the testimonies of history interwoven with the existence of a people whose antiquity, learning, and architectural skill shone conspicuously ere the rays of civilization illumined the darkness of Europe. This gentleman (Mr. Robinson), in referring to those arguments on the mortar question, makes a serious blunder in history by stating that Ireland, "the locality and almost the very existence of Erin was unknown to the Romans" in the first century. Shades of history appear and dissipate the delusion! Tacitus, the Roman historian, who wrote in the first century, referring to the expedition of Agricola into the British islands, and his proposed invasion of Ireland, says—"He stationed troops along that part of Britain which looks to Ireland," and that "he gave his protection to one of its petty kings, who had been expelled by faction. I often heard him say, that Ireland could be conquered and taken with one legion and a small reserve." Although Ireland was never invaded in a warlike spirit by the Romans, the country, its religion and laws were well known to them centuries before the Christian era. Even when the Romans sorely harassed Britain, Crispin left Ireland with a powerful force, and attacked the Roman forces, demolishing their fortifications, and returning to Erin with great spoils as trophies of his victory. The very existence of sun-worship in Rome, and the knowledge then possessed by the Romans through their intercourse with the eastern nations, and the antiquities observed by them in Egypt, where Round Towers then stood in ancient grandeur, looking down as it were upon the Vandalism of Julius Cæsar, when the Alexandrian library was lost to the world, and doubtless, memorials perished in the flames which would for ever have settled the vagaries of antiquarian research—this proves that they were not ignorant of this country; inasmuch as we find a corresponding Druidical knowledge among both peoples, and the coalescence of Egyptian, Roman, and Phœnician astrology with the heathen deities worshipped by the sun-worshippers of those nations. A temple was built at Rome to Belus or the sun—that planet was deified by

a similar name here. Ireland was well known to the Greeks. Our great Archbishop Ussher in this respect considers our antiquity superior to any that the Romans could boast of. Orpheus of Cretoua (400 B.C.) describes Jason's sailing by Ireland. Cæsar himself mentions that "such as chose to excel in letters repaired to Britain or the isles of Britain." That Ireland must be ranked among the isles of Britain is evident from Ptolemy, who calls one "Albion," the other "Irene." Eustatius says "there are two British islands, Oriernia and Allowin, or Bernia and Albion," and the eloquent St. John Chrysostom calls Britain and Ireland "the British Isles." Diodorus Siculus (second century) records that the Hyperboreans, or Irish, worshipped in round temples dedicated to Apollo or the sun, and very skilful in the use of the harp. Josephus, the Jewish historian, testifies that Herod, the sun-worshipper, built round towers on a mountain about seven miles from Jerusalem (this was in the first century), and he also says that the kings of Persia and Media were burned in the one in the east. Having thus briefly disposed of Mr. R's historical blunders, allow me to examine his credibility on similar ground as to the "old windmill at Crumlin." The very name Croom—the great Croom, or Tarrau, the thunderer—proves its heathen origin. In the time of Henry VII. nearly 500 hundred years ago, an act was passed in the Irish Parliament, held at Trim, inflicting the severest penalties against any one crying "Crom-aboo" and when the O'Donovans were driven by the invaders in the time of King John, into the western district of Cork, they erected a magnificent castle, surrounded by four round towers, from whence it derived the cry "Crom-aboo"—the present motto of the Leinster family. Villanueva, the celebrated Spanish antiquarian, in his work on Phœnician Ireland, dwelling on the fact of those edifices existing before the Roman conquest, and the sacrificial customs of the ancient Irish, says—"We trace its (Phœnician) vestiges in Cromlin, or Crumlin, a little town in the county of Dublin, as well a little village in the barony of Massareene, in the county of Antrim, which name the Irish interpret as the chapel or shrine of Crom, where the idolaters used to sacrifice to this deity. To this origin they also refer Crumlin water, the name of a river in the same barony of Massareene and same county of Antrim." Anyone who takes the trouble to examine the remains of the old tower at Crumlin, will be convinced of the fallacy of considering it the remains of a windmill. The old wall built out of its material, surrounding the field in which it stands, appears at least 100 years old, and the oldest inhabitant never recollects the building to have been used as a windmill. A relation of mine resident in the locality nearly half a century, always heard it mentioned as the remains of an old round tower. I would request antiquarians to pay a visit to Crumlin, and examine for themselves, and they will, I feel confident, arrive at the conclusion that the remains belong to a veritable round tower, in no way connected with the windmill which my opponent confounds with the old lime-kiln, a short distance from the site on which it stands, and that Villanueva was not far astray in his derivation from "the Phœnician word Crom arithin, a shrubbery decided to fate, Cromlin from Cramlun," and other explications showing the Druidic-grove worship and the eastern fire worship were celebrated along with the most diabolical orgies in this very locality at the shrine of Crom. So that the chimerical fancies of Mr. R. rest on no better foundation than assertion, devoid of the least scintilla of proof. Again, he presumptuously takes Dr. Petrie to task about his remissness in not attaching "sufficient importance to the similarity in detail of the round towers and the Saxon churches in England." On the architectural point I defy him to upset, on these grounds, the similarity in Egyptian and Roman architecture. The doorway of Ardmore Tower, County Waterford, is simple round form, not unlike the arches of Vespasian's Amphitheatre or the Coliseum;

Devenish—door nearly similar; Drumlene—very plain round arch; Roscrea—plain circular arch; Clonmacnoise—plain circle of large stones; Dysart, County Clare—plainest arch of blocks of stones; Kilmaedugh—plain blocks of stones in arch form; Glendalough—similar; Antrim round tower—an oblong square of large blocks of stone, and a Baal's cross over the doorway; Swords and Roscommon—an oblong square, the doorways of blocks of stone, primitive Egyptian; Dysart, County Limerick—arch Egyptian, plainest block. But, as Marcus Keane proves, the strongest argument of the heathen origin of the round towers is that "Eighty of the supposed sites of towers and places are associated with heathen divinations." One thing I have established, viz., that the high places of Baal recorded in Scripture were identical with the Irish round towers, and that the names of the towers speak with a silent eloquence which none but the sceptic can resist, or attempt to refute. At Swords, St. Canice's, Kilkenny, Cashel, &c., the towers are close to the steeple, showing that they were the safes—the others for the belfries to sound alarms. In 2 Kings ix. 13, "On the top of the stairs, and blew with trumpets, saying, Jehu is king"; and in 17th verse, "There stood a watchman on the tower in Jezreel." Here we have trumpets announcing great events 880 B.C., in the same manner as the ancient kings of Ireland proclaimed, through their priests, the festivals of Baal. Daniel O'Connell used to say facetiously—"I have my opponent so much under my knuckles, I fear I shall miss him." I leave it to candid public opinion—I leave it to those true Irishmen who really know the history of their country, whether, placing my arguments and proofs beside my opponent's, they will not acknowledge on whose side lies the imputation of inability to examine the subject, not in the light of garbled extracts, but historically and faithfully, and then it shall be determined who should "learn a great deal of archaeology before he again ventures to give an opinion on the origin and uses of the Round Towers of Ireland"—for in words akin to Byron's, our own Thomas Davis's lines find response in many a Celtic heart—

"Two thousand years, 'mid sun and storm,
That tall tower has lifted its mystic form."

CALEB PALMER.

POST-OFFICE NOTICES.

THE Italian Post Office having established direct and accelerated trains between the French frontier and Brindisi, and having offered, as an experiment, to convey by those trains British supplementary mails for the East Indies, China, and Australia, commencing with the 2nd inst., mails supplementary to those dispatched on the previous evening, via Marseilles, will henceforth be made up on the morning of every Saturday, and forwarded through France and Italy to Brindisi, and thence by Italian packet to Alexandria. It is expected that these supplementary mails will reach Alexandria in time to go on to Suez with the mails forwarded weekly from Southampton and from Marseilles; but, in the event of the packets from Brindisi not arriving in due course, the mail-packets leaving Suez will not delay their departure. Letters, &c., intended to be forwarded in these mails must be specially directed "via Brindisi."

Mails for Egypt, containing letters and newspapers only, will henceforward be made up at the London General Post Office on the morning of every Saturday, and dispatched by day mail to France for transmission via Brindisi. Letters and newspapers intended to be forwarded by this route must be directed "via Brindisi."

The Treasury has directed that, after the termination of the present year, the privilege now granted to commissioned officers of the Army, Navy, and Royal Marines, as well as to superintending or first-class Army schoolmasters serving abroad, of sending and receiving their letters at the reduced British postage of sixpence per half ounce, in cases where the postage of ordinary letters to or

from the same place is higher than sixpence, shall be withdrawn. The privileges as regards letters of non-commissioned officers, soldiers, and seamen in her Majesty's service will remain undisturbed. The French mail-packet which now leaves Bordeaux for Brazil and the River Plate on the 25th of each month will leave on the 24th, and, consequently, the mails from this country intended for conveyance by that line will be made up in London one day earlier than heretofore—namely, on the evening of the 22nd of each month. Supplementary mails will be despatched on the morning of the 23rd, on the chance of arriving at Bordeaux in time for the packet. On the homeward voyage the French packet will be due at Bordeaux on the 3rd instead of on the 19th of each month, thus bringing the mails into London about the 5th, and admitting of replies being dispatched by the British packet leaving Southampton on the morning of the 9th. The British packets in like manner have altered their day of arrival at Southampton with homeward mails from the 5th to the 18th of the month, admitting of replies being sent via Bordeaux on the 22nd.

Post dividend warrants issued by the Bank of England will be cashed at money-order offices in the United Kingdom, provided that, when the holder of the warrant presents it for this purpose, the postmaster of such office shall have sufficient Post-Office funds in his hands to meet the payment of the warrant, and that the holder is known to the postmaster, or can give him a satisfactory reference.

On account of the refusal of the Governor-General of the Brazilian Post Office to give any receipt for registered letters sent from this country by the British mail-packets, no letters for Brazil intended to be sent by the agency of correspondence named can be registered.

Mails for Malta intended for conveyance by the line of private steamers proceeding direct from Marseilles to Malta will be made up in London during the months of October, November, and December, on every Monday morning. Supplementary mails will be made up on the evenings of the same day. Mails will also be made up for transmission via Messina by Italian packets in connection with French mail-packets from Marseilles on five evenings, and on the five following mornings in each of the months specified.

ACCOMPLISHED SCRIBES—IRISH AND ENGLISH.

A good deal of merriment was caused by the following original epistle, read by the Town Clerk at the meeting of the Drogheda Corporation last week:—

"Drogheda,

October 1st, 1869.

"To the Mayor

Aldermen and Town Councilors

Assembled,
"Gentlemen having now for a third time sent in my memorial in Before you and refused to be heard or Read by the Town Clerke I will now Press upon you to have it read. Gentlemen It is for me now to state to your honourable Body that as the time of Office is now Expired for the Bellman, You will be so Good as to Dispose of him, as he is not a fit and Competent Person suitable for the Situation he now holds as the law Directs you to do, keeping a Good man's place up. Gentlemen I only wish you to look where your £15 per year Goes too. For Nothing only for him to be a servant or Runner for the Town Clarke. Gentlemen, you have to pay for Posting Bills and other matters which is no need for. Gentlemen, you can Either do without a Bellman, or have a Proper Man. Gentlemen, if there is a Bellman, I Offer myself as a Fit and Competent man suitable for the business, & As it was the wish of the late Bellman that Died that I should get the situation Taking all in to Consideration your Obedient servt

"George Griffith ex Bellman
for Town and Country"

The following singular note was recently addressed by a candidate for the post of chapel-keeper, to the deacons of a Liverpool chapel:—

"Dare Sir and Gentlemen of Committe of Ros

Plase Capel,—I was here from a member that your gude father publis that there was want a Capel Ceper for new Brasptteraine Capel in Clarence Street, and I offers myself for plase. I was not be member but was have it in my mind to offer myself and if was get Capel I comes a member quick sticks. I was not mared but was have a woman who is member in my minds eye to marry er. I certifie that I will kape the Capel awful clane—My professun is labor and I was work sometimes for —. Plase let us no as soon as you can as I was like to bv fernish for new hose. I was sit under gallery in Ros Plase, and I was to be 29 ears in my life. I remene, Gentlemans, your umble servan —."

LAW.

ARBITRATION CASE.

O'Connor v. Curran.—This case, which was referred, by consent, to the arbitration of Mr. M'Curdy, has terminated in a verdict for the defendants. The plaintiff had undertaken to erect a dwelling-house at Dundrum for the late John Adye Curran, Esq., and differences having arisen on the winding up of the accounts, a suit was instituted by the plaintiff against the representatives of the late Mr. Curran for their demand. The defendants lodged £90 in court, which the arbitrator held was a sufficient sum to discharge the demands of the plaintiff. Costs to follow decision.

NOTES OF WORKS.

Extensive works have just been commenced at Glenart Castle, near the Wooden Bridge, Co. Wicklow, the seat of the Hon. William Proby. A great portion of the castle is to be pulled down and restored. Offices are in course of erection. The works will cost about £15,000. Mr. M'Curdy is the architect. Mr. Bolton is the contractor for the builder's work, and Messrs. Ross and Murray, Middle Abbey-street, for the plumbing work.

New offices are to be erected, from the designs of Mr. M'Curdy, for the Irish Railway Clearing House, adjoining the College of Physicians, Kildare-street. Mr. John Nolan, Meredyth-place, is the contractor.

Messrs. Bewley and Draper have commenced the levelling of the old Mary-street Chapel and the buildings adjoining same, with a view to the erection of large additions to their premises in Mary-st. Mr. M'Curdy is the architect; Mr. Thomas Millard, Harcourt-street, the contractor.

The new Roman Catholic Church of St. Joseph, Glashule, Co. Dublin, was consecrated on Sunday last by Cardinal Cullen. The designs were furnished by Mr. G. C. Ashlin. The contractor was Mr. J. Cormack, of Talbot-street. A description (with interior and exterior views) was given in No. 176 of the IRISH BUILDER.

A large five-light memorial window, by Wailes, Newcastle-on-Tyne, has been placed in Derry Cathedral, together with the following inscription:—"In memory of the Right Rev. William Higgin, D.D., Bishop of Derry and Raphoe, who died in this city, July 12, A.D. 1867. By the clergy and laity of the diocese."

LIVERPOOL.

THE new Liverpool and Manchester Railway is being energetically pushed forward. The whole length of the line between the junction of Grassendale near Garston, and the Manchester junction near Timperly, has been divided into sections, upon each of which several hundreds of artisans and labourers are at work. A long and lofty viaduct will be carried over the valley intersected by the Sankey canal. A tunnel line from Egerton-street, Toxteth Park, to Ranelagh-street, Liverpool, is about to be commenced. It has been further decided to commence actual operations in connection with the erection of the new central station at Liverpool in the course of next spring.

NEW PATENTS.

R. M. Caffall and D. Miller, Alton, "Wall Water-proofing."—The inventors prefer to take paraffin in its solid state and subject it to the action of heat by melting it in a metallic or other suitable vessel; when thoroughly liquefied they apply it by means of an ordinary brush, such as is used by painters, to the wall or other surface with what is known as a "painter's stove," or "devil," and after the liquid paraffin, as above described, has been applied, they again use such "stove," or "devil," to liquefy and force in any paraffin remaining visible on the exterior of such wall or surface.

J. Bathgate, Edinburgh, "Gas meters."—The case of the meter is constructed in two distinct parts—an under part and an upper part—the under part containing the movable diaphragms and passages thereto, whilst the upper part encloses the valve box and valves with the regulating and indicating mechanism, none of which, however, are attached to it, but are placed on the top of the under part, the upper part merely serving as a protective covering; and these two parts, namely, the upper and lower parts of the case, are put together by means of screws or other similar fastening. The valve-box is made separately, by preference of cast metal, and is also retained in place by means of screws.

MISCELLANEOUS.

In an address on the occasion of the distribution of prizes by the Science and Art Department at Dundalk, the Right Hon. Chichester Fortescue described the "Royal College of Science for Ireland" as "an institution of which *very little was known*!!" Our worthy Irish Chief Secretary should have stated the "Reason Why."

Everyone who burns ordinary gas has remarked the great diminution of the illuminating power which follows the admixture of air in the pipes, and which enters on the principle of the diffusion of gases, even when there is a pressure within the pipes, if the cocks and joints are not perfectly tight. In the case of the gas from cannel coal, however, it is found that the addition of as much as twelve per cent. of air does not diminish the illuminating power, but rather increases it.

What the spectroscope is doing for the sky, the dredge is doing for the bottom of the sea,—that is, revealing its secrets. Almost simultaneously with the news of the return of Dr. Carpenter's expedition, we hear that the Norwegian Government are sending out a corvette properly equipped for a dredging voyage to Brazil. Students of natural history will learn with satisfaction that Prof. Esmark is the naturalist in charge; and they may reckon on large additions to our knowledge of the zoology of the coast and deep sea in an important region of the South Atlantic. A Swedish corvette is also cruising in southern latitudes and when last heard of was dredging round the Azores. It must be acknowledged that our Scandinavian neighbours deserve praise for these undertakings. There is something more in them than the criniching of zoological science; for the explorers will bring us particulars of the geology of the sea-bottom, of the depth, of the temperature at different depths, and of effects of pressure. Another fact connected with this subject is, that Prof. Loewel, of Stockholm, while dredging in the Strait of Tornea, discovered zoophytes hitherto unknown among the existing Fauna, but which show a close analogy to certain crinoids. Here, then, as Prof. Milne-Edwards remarks, is a real zoological re-appearance of animal forms which had completely disappeared from remote geological periods. What is the zoological or geological significance of this interesting fact, and are there many more secrets to be revealed from the bottom of the sea?—*Athenæum*.

A new knitting machine, capable of taking 324,900 stitches a minute, and of making 500 shirts a day, has been invented in Canada.

A mechanical school for women has been opened at Warsaw, under the immediate superintendence of government, its object being to train the young women of the lower classes in all the lighter kinds of handicraft which may be pursued without injury to health.

FATAL ACCIDENT TO A "STEEPLE JACK."—Thomas Butterson, a "Steeple Jack," met with his death on Tuesday evening. He was repairing a tall chimney at Mr. Farmer's chemical works, West Gorton, when the rope by which he was holding on broke, and he fell from a height of 69 ft.

SHIPS FOR THE SUEZ CANAL.—A firm in Liverpool is providing itself with steam ships for Eastern trade *via* the Suez Canal. These ships, which are to be 450 ft. long by 35 ft. beam, are being built at a yard at Belfast.

THE EXPANSION OF MINERAL OILS.—Henri Sainte-Claire Deville has presented to the Academy of Sciences, at Paris, a paper—the third of a series—on the "Physical Character of Mineral Oils," in which he mentions the increase in bulk occasioned by an elevation of temperature, as a prominent cause of danger by fire where petroleum may be stored. The scale of Baumé's hydrometer, a wholly arbitrary one, represents for each degree within the usual limits of crude American petroleum, as nearly as may be, four and a-half thousandths of the density of water at 66° Fahr. As every increase of temperature of 10° Fahr. equals a decrease in density of 1° B., the expansion of oil may be taken, without sensible error, to be .00045 of its bulk for each degree of Fahrenheit's thermometer. Allowance for expansion is always made in shipping oil, except in the old-fashioned wooden tank cars, where the oil is permitted to force its way through the hatches, roof, and sides of the tanks. In shipping in barrels, it is customary to leave about one gallon "outage," as in 50° (which may be considered the extreme variation in temperature likely to occur while the oil is in transit) 44 gallons would become 45. It would be safer and more economical to allow yet greater room, were it not for the advantage, in that case, apt to be taken of the shipper by the consignee. The increase in bulk, in the summer, of oil stored in iron tankage in winter, is also of considerable importance.—*Oil Trade Review*.

A VELOCIPEDE FOR POSTMEN.—The *Journal des Postes* states a committee nominated by the Administration of the French Post-office has examined some new models of velocipedes for the use of rural postmen, and that it has adopted one with three wheels very ingeniously constructed. A mechanism worked by the hands enables this vehicle to ascend the steepest incline. There is also a place behind for carrying a box or portmanteau of moderate size. The inventor is an engineer of Périgueux.

The city of Milwaukee is putting down a kind of pavement, which is described as follows:—The old pavement having been removed, the earth is cut to the requisite depth to secure the proper guide for the surface. After the ground-work is thus prepared, it is covered with common inch pine board. Upon this foundation Norway Pine planks, two by six inches, are laid edge up and spiked together. The planks being green, are readily sprung to the intended curve of the roadway, and then spiked. The pavement, when completed, will be covered with fine gravel, which will fill any remaining crevices in the surface.

At a recent sitting of the French Academy a report of some interest was presented by M. le Docteur Burq. The report had been previously sent in to the Academy of Medicine by M. Vernois, on the subject of the prophylactic treatment of cholera by means of copper. Having observed that the copper-workers have a decided immunity from cholera, M. Burq has taken upon himself to "work up" all the statistics in the bureau of the Préfecture of Police in reference to the visits of the authorities to the parents of the deceased. He has found as a result that during the two last severe epidemics the mortality among copper-workers was only 3 in 10,000. But M. Burq has found that all copper-workers are not similarly protected, and hence he has classified artisans of this description under four distinct categories:—(1) Preservation in the first degree: opticians, dry polishers, stampers, turners, makers of musical instruments, &c. Population, 5,650; cases of cholera, 0. (2) Preservation in the second degree: founders, lampmakers, chasers, mounters and turners in bronze. Population, 14,000; cases 7. (3) Preservation in the third degree: gravers in copper, &c. Population, 6,000; cases 6. (4) Preservation in the fourth degree: jewellers and clockmakers, &c. Population, 11,500; cases, 16. The workers in steel and iron, who were 28,000 in number, had 202 cases of cholera; among others the proportion was 10, 20, or 40 times higher. There is, he said, a "society for mutual assistance," which only admits turners, mounters, and gravers in bronze, including about 300 members, and during the epidemics of 1832, 1849, 1853–4, 1865, and 1866, there was only one fatal case and that was a man who had given up his trade two years before.

A ROAD FOR TRICYCLES.—An enterprising individual at Berlin proposes to board over all the gutters on each side of the streets, and this roadway, three or four feet wide, is to be the future velocipede high road of the city. A thousand tricycles are to be placed on it, each with a practised driver dressed in a neat uniform, who will undertake to conduct one person with letters parcels, &c., along this road. As velocipedestrians always drive straight, room to turn is not required, and when the road is free it will serve as a footpath. A small charge for passengers, parcels, and letters will, it is estimated, give a fair return for the cost of construction. He argues that, besides the general convenience of his plan, it will be a great advantage to Berlin to bridge over the gutters, as

they are at present very unsightly, and are liable to be frozen over in winter. Moreover, the establishment of footpaths will facilitate the better regulation of the street traffic, and effect a great saving in the expense now incurred by cleaning the streets. The tricycles are to have a little canopy in winter, an umbrella being a sufficient protection in the summer. The projector calculates that a speed may be attained equal to that of an ordinary carriage at least, and guarantees all possible convenience and safety in the transit.

THE HEALTH OF DUBLIN.—In the Dublin Registration District the births registered during the week ending October 9th, amounted to 132—60 boys and 72 girls. The average number in the corresponding week of the years 1864 to '68 inclusive, was 150. The deaths registered during the week were 127—61 males and 66 females. The average number in the corresponding week of the previous five years was 145. Thirteen deaths were caused by scarlet fever. Measles proved fatal in 6 instances. Nine deaths resulted from fever, viz., 1 from typhus, 4 from typhoid, and a like number from simple continued fever. Diarrhoea caused 8 deaths. Nine deaths were attributed to convulsions. Thirteen deaths were referred to bronchitis, and 1 to pneumonia. Two deaths were ascribed to liver disease, 1 to inflammation of the liver, 1 to jaundice, 1 to kidney disease, and 3 to nephritis or Bright's disease. Heart disease caused 5 deaths. Seven deaths were attributed to phthisis, 4 to mesenteric disease, and 5 to water on the brain. Three persons died from cancer. One accidental death was registered. Seventeen of the deaths registered during the week occurred in hospitals and other public institutions; of this number 4 took place in the North Dublin, and 9 in the South Dublin Union Workhouse. The number of deaths registered in the entire of the Dublin Registration District during the week, represents an annual ratio of 21 in every 1,000 of the population by the Census in 1861. In London the ratio was 22 in every 1,000 of the estimated number of inhabitants; in Glasgow 25; and in Edinburgh 25. The deaths registered in No. 1, North City District (Summer-hill), afford an annual ratio of 27 in every 1,000 of the population—the Mater Misericordiae Hospital is situated in this district; in No. 2, North City District (Coleraine-street), which includes the Rotundo Lying-in Hospital and Jervis-street Hospital, the deaths registered amounted to 21 per 1,000; and in No. 3, North City (Blackhall-street), to 34 per 1,000—the North Dublin Union Workhouse, the Hardwicke, Richmond, and Whitworth Hospitals, and the Richmond District Lunatic Asylum, are situated in this district. In No. 1, South City District (Meath-street), which includes the South Dublin Union Workhouse, the Cork-street Fever Hospital, and Steevens' Hospital, the deaths registered afford an annual ratio of 25 per 1,000; in No. 2, South City District (High-street), the ratio was 16 per 1,000; in No. 3, South City District (Peter-street), which includes the Coombe Lying-in Hospital, and the Meath and Adelaide, and Mercer's Hospitals, it was 22 per 1,000; and in No. 4, South City District (Grand Canal-street), in which Sir Patrick Dun's and St. Vincent's Hospitals are situated, it was 14 per 1,000. In the suburban district of Rathmines the annual ratio was 13 per 1,000; in Donnybrook it was 25—the City of Dublin Hospital and the Hospital for Incurables are situated in this district; in Blackrock the ratio was 15; and in Kingstown 3 deaths per 1,000 of the population by the census in 1861.

GOLDSMITHS' WORK.—The progress of fine art manufacture in this branch of trade is strikingly exemplified in a little work published by J. W. Benson, of 25, Old Bond Street, and of the City Steam Factory, 58 and 60, Ludgate Hill. It is enriched and embellished with designs (by Italian, French, and English artists) of Brooches, Bracelets, Earrings, and other articles, suitable for personal wear, or Wedding, Birthday, or other presents, with their prices. Mr. Benson (who holds the appointment to H.R.H. the Prince of Wales) has also published a very interesting pamphlet on the Rise and Progress of Watch and Clock-making. These pamphlets are sent post free for two stamps each, and they cannot be too strongly recommended to those contemplating a purchase, especially to residents in the country or abroad, who are thus enabled to select any article they may require, and have it forwarded with perfect safety.

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All Communications respecting the IRISH BUILDER, should be addressed to MR. PETER ROE, 42, Mabbot-street, to whom all payments for Subscriptions and Advertisements must be made.

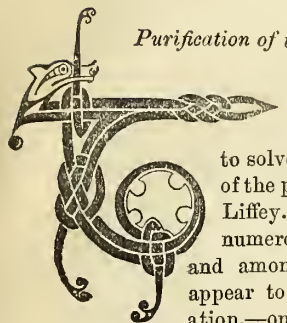
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The Irish Builder.

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Purification of the River Liffey.



THE Corporation have at length taken action to solve the difficult question of the purification of the River Liffey. They have obtained numerous engineering plans, and among the rest two which appear to merit most consideration,—one of these from Mr.

Bazalgette, the other from Mr. Neville. Both, we understand, propose to deliver the sewage matter into intercepting conduits, which are ultimately to deposit their contents at some point on the north side of the city, with a view to their utilisation. In a commercial point of view, we have no doubt the scheme would prove eminently successful, and produce a large amount of revenue; but whether it would ultimately decrease the pestilential odours so justly complained of, we must leave others to determine. The deputation from the Corporation which lately waited upon the Chief Secretary, to request his assistance in having a Government commission appointed to decide upon the best plan, have certainly made a most judicious move in the matter. They fear (and justly) a considerable amount of opposition; and when we remember that, a few years since, the plans of Messrs. Hemans, Hassard, and Falkiner proposing to construct intercepting sewers, and utilize their contents by irrigating the North Bull, the estuaries of Baldoyle and Malahide, were met with the most determined opposition from Lord Howth, the late Sir B. L. Guinness, Mr. Vernon, the Ballast Board, and others, we may readily prophesy that any modification of these plans will be encountered in a similar way. Much as we would be pleased to see the sands of the North Bull and the strands of Baldoyle and Malahide converted into arable land and smiling meadows; and much as has been written with regard to the innocuous process of irrigation practised at Edinburgh, Croydon, Norwood, and other places where we are told it has been carried out without perceptible emanation or effluvia, we are inclined to be sceptical from the engineer's own acknowledgment that the southern side would be unsuitable for the discharge of sewage matter, "owing to the rapidly increasing population of that locality,"—this only refers to its discharge into the open sea; nevertheless, it is an evidence that considerable effluvia must arise, although possibly it may be less objectionable by absorption when distributed over large areas of sandy substratum.

The original plans, as prepared by Mr. Neville, contemplate the delivery of all sewage matter into one large discharging reservoir, to be constructed outside the East wall, but within the municipal boundary, at a point near the well-known bathing wharf. These have been adopted by Mr. Bazalgette, who additionally advises that the intercepting sewers be continued to a reservoir and pumping station to be constructed on the waste

ground between Annesley and Ballybough bridges, thence to be conveyed by gravitation in a sewer 7 ft. 6 in. diameter along the Clontarf road to a reservoir intended to be situated at the North Bull, and there discharged into the sea at ebb tide, or utilized for irrigation and other farm purposes.

There are numerous objections to the discharge in large volume of sewage matter into the sea at a point so near a large city, but the remedy for this is, after all, but a question of increased expenditure. We are told that all attempts at deodorization or precipitation upon a large scale have hitherto completely failed, and we are asked to believe that the purification of sewage water, when passed over grass lands, is so complete, that of two bottles—one containing the sewage water of Croydon, the other procured from Loch Katrine—that the former was actually selected in preference (as the purest water) to the latter; but until we have more demonstrative proof or arrive at the discovery of perfect neutralizing influences to prevent effluvia, we shall be slow in recommending utilization, even at a considerable pecuniary sacrifice.

There is an end to all things earthly. The sewage of Dublin will continue to flow, and possibly increase in quantity, for centuries. The sands of the North Bull, Baldoyle, and Malahide cannot be irrigated for ever. There is a vulgar adage that "what is good for the goose is equally good for the gander"; then why not, if the theory of the bottle can be realized here as well as at Croydon, provide for contingencies in time? There are thousands of acres of strand, stretching from Ringsend to the Pigeon House Wall and thence to the Black Rock, where irrigation could be experimented upon at a much less cost of transit than conveyance to Baldoyle and Malahide.

Although there is no analogy between the cases, it may not be uninteresting here to contrast the objectionable nature of the utilization of sewage as practised for time immemorial outside the most polished city in Europe with our proposed plans.

Everybody knows that Paris has been for centuries, and is still to a considerable extent, drained upon the cesspool system, the contents of which are removed by an expensive process (pneumatic carts) to deposit-grounds outside the city, and there manufactured into a fertilising manure called *poudrette*. These deposit-grounds are farmed out, and produce a revenue averaging from £20,000 to £30,000 sterling annually; in addition to which the ammonia extracted by chemical processes contributes an amount of some thousands more.

To Mr. Rammel's report on the cesspool system of Paris, presented in 1850 to both Houses of Parliament by command of her Majesty, we are indebted for the following:—

"The principal and, until a few years ago, the only place of deposit for this matter was the *voirie* of Montfaucon. M. Jules Garnier, in his '*Visite à Montfaucon*,' says for more than nine centuries Montfaucon has been devoted to this purpose; it was there the inhabitants of Paris were in the habit of depositing their filth before the walls of the capital extended beyond what is now the *Quartier Central*."

After describing its position upon an elevation to the north of Paris, its numerous excavations, reservoirs and basins, the mode of deposit, the drying and all other operations in connection with the production of the manure, Mr. Rammel thus continues:—

"The emanations from the *voirie* are, as may well be supposed, most powerfully offensive. To a stranger unaccustomed to the atmosphere surrounding them, it would be almost impossible to make the tour of the basins without being more or less affected with a disposition to nausea. Large and numerous bubbles of gas are seen constantly and rapidly rising from a lake of foetid water, while evaporation of the most foul description is going on from many acres of surrounding ground, upon which the solid matter is spread out to dry. Such is the state of fermentation of the liquids in the basins that their temperature is said to be considerably elevated. In perfectly calm weather these disgusting exhalations spread over a wide area around the *voirie*. From habit the inhabitants of the neighbourhood may disregard them, but a stranger coming from Paris will perceive a disagreeable odour before or immediately after he has passed the Barrier; a fresh breeze will carry them over a distance of many miles, and when blowing from a northerly direction the foul volume is swept by it entirely across Paris; under peculiar states of the atmosphere its presence may be distinguished at the opposite extremity of the city; in the centre, and particularly along the quays, it is at such times most disgustingly apparent, while on the Boulevards, Bonne Nouvelle, St. Martin du Temple, &c., it prevails in intolerable strength; there it penetrates everywhere, pervading the cafés, the theatres, and the houses."

M. Parent du Chatelet thus describes the gigantic nuisance in a report to the Council of Health written 1833:—

"The influences of this *voirie* have necessarily increased with the quantity of matter which has been deposited there; at the present time the infectious emanations given out from it are insupportable at all seasons within a circumference of 2,000 metres (about 1½ mile), and the winds carry them sometimes with all their intensity to a distance of 4,000 metres; and evidence collected by the commission charged to ascertain the extent of the ravages of the cholera in rural communes shews that certain states of the atmosphere, rarely occurring it is true, propagate them even to a distance of eight French miles (nearly five English miles)."

With the foregoing facts staring us in the face, we think we are justified in objecting to the accumulation of sewage matter, and even its discharge in large volume into the sea, unless at such distance from the city as that it will be next to impossible its effluvia can reach populated districts, and therefore await patiently a report from a Government commission.

ELIGIBLE BUILDING SITES AT RATHMINES.

We have much pleasure in drawing attention, both here and through the medium of our advertising columns, to the facilities now offered for further extending that most important and flourishing outlet of our metropolis—the Township of Rathmines. The growing attraction and consequent prosperity which have attended this township since its creation a few years ago are attributable jointly to its fine natural advantages and the prudent management of its Board of Commissioners. Commencing with a moderate local rate, the Rathmines Commissioners have firmly kept it at a minimum figure, compatible with the various improvements they have brought about; until, at present, they are entitled to the credit of possessing the lowest-rated township around Dublin, with the most substantial, as well as most tasteful, system of public improvements. While according to them this fair praise, it is but just to add that they have had the benefit of great natural advantages. Rathmines has not inaptly

been designated our Dublin "Belgravia," but while in rapid extension and gay appearance it claims points of similarity, it further possesses in its fine mountain scenery, high position, and well-known salubrious character, elements altogether wanting in its London prototype. In these latter advantages, the large tract of building ground we refer to (known as the lands of Dunville) is particularly favoured, while its position in the very heart of the township cannot fail to recommend it to notice, extending thence to the Palmerston grounds, and thus affording facilities for connection with the fine class of buildings now erecting on Temple Road, Palmerston Villas, &c. On the west it is bounded by the handsome structures lately built by Mr. Plunkett (Palmerston Road), extending thence, across the Dublin and Bray line of railway, to Cullenswood Road and Sandford. No doubt the railway company will, at no remote period, find it to their interests to provide accommodation for this large and increasing neighbourhood, especially as facilities for a station exist on the Dunville lands. These lands are now being laid out in building lots, under the supervision of Mr. E. H. Carson, architect, of Harcourt-street.

A PATENT SLIP AT DUNDALK.

THE Harbour Commissioners, at their meeting on Tuesday week, had under consideration the project for the construction of a patent slip on their quays. The chairman (Nicholas Carolan, Esq.), in giving his opinion on the matter, said there were three points to be pronounced upon—was it practicable, what would it cost, and could they obtain the money? He thought it was practicable, and they might be able to get the money. At all events, if they should undertake it, it should be to their credit. It seemed there was an opinion prevalent that slips were only made for repairing small vessels; but that was a mistake, as could be proved from what might be seen at Glasgow. He proposed that the slip should be 300 ft. long, which would more than suit the largest vessel that came into the port. For a slip of 400 ft. in length, the cost would be £1,675; £425 for engine and boilers; manager's house, workshop and entrance gate, £900; making a total of £3,000. He was aware Mr. Neville had plans for a graving dock, but he did not go into that question at all. By the 72nd section of their act, they had power to raise money for such works. They had borrowed only £20,000 to erect the rampart, and they had power to raise much more than that sum. He proposed they should go to the Loan Commissioners, and when they had their plans ready they could make an application to them. He heard persons talking of the Greenore line, and the injury it would do the port, but he thought that after all it would not prove injurious. They were not to be frightened by it; for they were not to suppose that several English railway companies would look on the traffic running to Greenore without making an effort to get some of it for themselves, and they would carry on operations through the port of Dundalk, so that he expected that the traffic in the port would be larger than ever.

Mr. Farrell thought they could get £3,000 at 3 per cent. or £90 a year.

Mr. Kelly would be glad to see the project completed, but he thought it would be going too fast at present to undertake it. It was said that Greenore would not injure Dundalk, but he did not agree in that opinion. He believed there would be a daily sailing from Greenore, and if that should be the case, he thought no reasonable man could say that it would serve Dundalk. The coal trade of the port would be injured, for the coal would be delivered at Greenore, and when the last

shovel-full was taken out of the vessels, they would sail away.

Mr. John Neville, C.E., said he had two plans of a graving dock; one to be near the barracks, and another near Dairy Hill. Whether they adopted a patent slip or a graving dock, one or the other of these sites should be adopted. The cost of a graving dock 300 ft. in length would be £13,000.

Chairman—We have in Dundalk a very prosperous man, Mr. John Connick. He is getting a ship built in Greenock at present; it cost him £100 to get the timber over there from Ireland, and it would save him £300 if the vessel were built in this country. He and others would not pass Dundalk, if we had a patent slip.

Mr. Robson said he had prepared a resolution on the subject, which he read as follows—"That the statement of Mr. Carolan respecting a patent slip is deserving of the best consideration of this trust, and that a committee be appointed to select a proper site, and report upon the matter generally to next meeting of the board." The following gentlemen were appointed a committee—Mr. Shekleton, Mr. Farrell, Mr. Kelly, Mr. Connick, and the chairman.

ANTHRACITE AT CASTLEKNOCK.*

On visiting, some weeks since, the limestone district in the neighbourhood of Castleknock, for the purpose of studying its palæontological and geological features, my attention was arrested by a small isolated patch of anthracite. At a little distance it presented the appearance of a cross section of a vein; but on closer examination I found its position in the rock to be not so distinctly marked, nor, though strictly limited to the area of a few square feet, so well defined and concentrated as it at first appeared. The detached fragments—evidently from the centre of the mass—were most regular in structure, having an approximately spherical appearance, due to the number, uniformity, and smoothness of their sides. The exposed surface showed many of these still undisturbed, the interstices being filled up with smaller fragments, flakes, and dust. I observed none exceeding the size of an orange, and but two or three so large. I was prevented by the lateness of the hour from making a more minute investigation of this interesting occurrence, but was fortunate in securing some excellent specimens for the cabinet and laboratory.

Having submitted one to the examination of gentlemen connected with the Royal College of Science, I was recommended by them to make another and more particular investigation of the locality, and to embody the results in the paper which I have the honour of submitting for your consideration.

I was enabled on the occasion of my second visit to make the following general observations:—

The anthracite occurs at a vertical depth of about 30 ft.; the only mineral with which it is immediately associated is calc spar, which is abundant in veins and blocks. In the shale and irregular rock near the surface, at a distance of about 50 yards, but on a lower level than the surface overhead, are traces of galena, iron, and copper.

It is an interesting fact, that notwithstanding that the quarry has been worked through an area of a couple of acres, and to a depth, varying with the surface of the ground, as great in some places as 50 ft., yet in all that extensive excavation—about one-half of which has been effected within the last two years—no trace of the mineral has been discovered elsewhere in it by the workmen; nor did the large rock surface, which I subjected to minute examination, reveal any further indication of its occurrence.

The rock is particularly compact and solid, being consequently heavy and singularly hard; yielding lime in great quantity, which is much sought by builders on account of its binding properties. The joints are remark-

ably few, and the bedding very indistinct on this side of the quarry, owing to the blasting, which is the only means of removing the rock. The best instances I could select gave for the dip an angle of about 56°.

An examination of the position and appearance of the anthracite afforded the following results:—A plane of stratification is visible in the neighbourhood; but, owing to the labour bestowed on this spot, it is but faintly recognised as it reaches the mineral. This feature might suggest the probability of its being a mere deposit in the line of bedding which here assumed the nature of a cleft; or that it is a concretionary formation in a hollow existing in the rock; and the singular isolation of the specimen, and the peculiarity of its structure, would encourage such hypotheses; but they suffer when taken along with the facts that the anthracite is too local to verify the first hypothesis, and that the distinction is not immediate and decided between the anthracite and limestone, as between limestone and calc spar and chert, in either of which cases the line of demarcation is distinct. Moreover, the concretion of carbon in a carboniferous rock is, I think, not at all probable; the case not being analogous with that of silicious matter, or any other body of different constitution and affinities from those of the mass in which it is contained. From the intimate mingling, one with the other, the imperceptible transition from dusty anthracite to dusty limestone, and *vice versa*, and the similar irregular and indistinct interstratification presented in this instance, the hypothesis which receives most support from these special appearances is that of contemporaneous formation.

It is closely associated with calc spar, which runs across it in veins, presenting, when mingling with it, a dull glassy aspect. I have two examples of slight traces of it in the spar of fossil shells—a *Productus*, and a *Producta Punctata*. In the laboratory it has resisted all attempts at fusion under the blow-pipe, and has also been ineffectually subjected to the action of acids.

Of the specimens exhibited, the two lumps of pure anthracite have interest as being so perfect in form, and are exceptions to the ordinary pieces, which vary in size from that of a walnut to that of a small egg.

The next specimen is also exceptional in its characteristics, as it indicates what may be termed the fusion of the species, and shows—what I remarked to be very rare throughout the whole bed—a peculiar lamination established on the polished surface of the limestone.

The examples exhibited of the union of the anthracite and limestone indicate perfectly the natural relation of these substances. In one the intermingling is not so well established, the lumps of anthracite (a couple of inches' thickness of which remains with the rock) are larger, and between them and the limestone is a case or coating of spar, which seems to be established in like manner round each individual lump throughout the mass, the spaces between the pieces being occupied by spar.

In the second of these instances the fusion is more complete, the characteristics of each less distinct, the particles smaller, and the spar absent, unless, as is always the case, that it occupies the cracks and spaces in the anthracite.

A third example, of this nature, from its size is more definite in its illustration; the large lumps being towards the centre of the mass, and the particles becoming smaller as they recede; till finally, on approaching the limestone, they assume the nature of dust, and so blend with the rock without any distinct indication of their junction. The spar is absent from this specimen as a distinct covering for the anthracite. This I have remarked to be always the case when the two substances are, as it were, fused into one another. On the side and back of the block, however, there are smaller nodules and particles enveloped in spar coatings, in the thickness of one of which is encased a small rhynchonella.

* Read by Mr. Thomas J. Nicolls, before Royal Geological Society of Ireland.

We come now to the examination of the last specimen exhibited; and this, if I mistake not, will prove of the greatest interest, and give rise to much speculation. It consists of a block of limestone, on one surface of which is what appears to be a broken circle of anthracite, enclosing a clayey deposit. The detection of casts on this clayey matter of concentric markings, similar to those of the *Producta Punctata*, showing the traces of the punctures, led me to the discovery of a hinge line. This is produced on the left side till it is lost and covered in the rock, and is broken on the right by a vein of spar. The clay limestone is evidently the cast of the interior of a shell; the anthracite a substitute for the organic matter which originally existed inside it. Nor is this an isolated example: I have, myself, two specimens of *Producta* in which slight traces of the anthracite occur; and a gentleman who has made this subject his study along with me has secured a specimen of *Producta* in which the space usually occupied by spar is filled altogether by anthracite.

THE HOLBORN VALLEY VIADUCT.

THE completion of this important work of London street improvement, very soon to be opened for public use, is an event upon which to congratulate the City Improvements Committee of the Corporation, and Mr. William Hayward, their skilful engineer. The viaduct was designed, as our readers are aware, to obviate the inconvenience of the steep ascents of Holborn-hill and Skinner-street, on each side of the valley of the old river Fleet, now occupied by Farringdon-street. The viaduct, not including its approaches, is 1,400 ft. long from end to end, and a little over 80 ft. wide. Of this space 50 ft. is given to a roadway throughout, and 15 ft. on each side for footways. The viaduct forms a gentle curve from the western end of Newgate-street, and then is continued in a straight line to the western side of Farringdon-street, occupying nearly the whole of the space which recently formed Skinner-street and a small portion of the churchyard of St. Sepulchre. From Farringdon-street westward it is carried by a gentle curve to the end of Hatton-garden, occupying the sites of the houses which formerly stood on the south side of Holborn-hill, the greater portion of the old roadway, and a large part of the churchyard of St. Andrew's, Holborn. For all purposes of traffic the road may be called a level, only sufficient inclination being given to insure the surface drainage running off. The viaduct is built on a kind of double system of arches. Those which support the roadway are plain, solid double archways, of 24 ft. span, and built of the same strength as ordinary railway arches. They are to be let as vaults for commercial stores. The footways, however, are supported by a system of, so to speak, cellular arches. These are 10 ft. diameter, and rise from one tier to three tiers. At the commencement of the incline, where the dip down is slight, there is only one tier or ground floor of these footway arches; but as the descent goes on increasing with the slope of the hill, it becomes necessary to add another tier of arches above the first, in order to keep the surface of the viaduct at its proper level. Thus, at one, the deepest, part at the foot of the hill there are three tiers of these cellular arches, one above another. All these arches are lofty, clean, and well-ventilated, and will be used as cellars to the warehouses built at the side of the viaduct. In front of the cellars, and between them and beneath the main road on each side, runs a subway along the whole length of the viaduct. This subway is 11½ ft. high and 7 ft. wide. It has three rows of cast-iron brackets along its sides—two for gas-pipes, one for water; these can be repaired without in any way interfering with the footway above. The sewage is provided for along the sides of the viaduct, below each subway. All the brickwork of these portions of the structure is most massive. In some parts the rings of the arches are as much as eight bricks thick

—an ample guarantee of their strength, when it is remembered that the Board of Trade only exact five rings of brickwork for a railway arch. In every case the foundations for the masonry have been taken down to the London clay, and bedded in 4 ft. of solid concrete. In some cases the clay was easily reached; in others more than 30 ft. had to be excavated before it was got at. This was mostly where the bed of the Old Bourne River and Fleet had left its deposits, and made the soil too soft. One of the handsomest features of the viaduct is the bridge which crosses Farringdon-street. It is in three spans, and its total length is 117 ft., and its width 80 ft. It is what is called a skew bridge—that is to say, it crosses the road diagonally, the angle being 52 deg. from the straight line. The three spans are formed thus—66 ft. span is given to the arch over the Farringdon-street roadway, and the two side spans are formed by the arches over the footways. The bridge consists of six cast-iron ornamental ribs, the two outer ones, which are seen from each side, being of an elaborate Gothic character. Where the spans over the footway meet the great centre arch, the six ribs are supported on hexagon granite columns—six, of course, at each side. The granite columns are 5 ft. in diameter, and are formed at the lowest face of grey granite; then a moulding of black granite, polished; then the hexagon column of red granite, also polished, and surmounted with a polished capital of black granite. The granites are from Aberdeen, Devon, Guernsey, and the Mull of Ross. At the four corners of the abutments are four demi-columns of polished granite of the same kind, but beyond this the interior columns of the abutments on the side away from the curb are of richly-carved Portland stone. Between the twelve main columns which carry the centre arch are powerful cross-bracing frames of cast-iron. The pierced iron balustrade which bounds the footway on each side is of an elaborate design, and so are the lamps with which the bridge will be lighted. The four outer capitals of the granite columns which support the side spans are to be surmounted with bronze statues. At each corner of this bridge four flights of steps, each about 11 ft. wide, will give access from Farringdon-street to the higher level of the viaduct. Each of these stairways is enclosed in stone structures, with ample light and ventilation. There are four landings on each flight of steps, which are formed of single slabs of Park Spring stone. The buildings at the four corners of the viaduct rise several stories above its level. The space beneath the steps will be appropriated for shops or warehouses, and above the steps the floors are to be utilised as offices and for general commercial purposes.—*Illustrated News*.

PURIFICATION OF THE LIFFEY.

A NUMEROUS deputation from the Corporation waited on the 19th ult. on the Chief Secretary, at his office in the Castle, for the purpose of asking his interest with the Government to induce them to appoint a Royal Commission to inquire and report as to the best scheme for effecting the purification of the Liffey. We give a condensed report of the proceedings.

The Lord Mayor read the following statement:—

"The Council, having bestowed considerable care and anxiety upon the question involving the sewage of the city, have sought this interview for the purpose of obtaining your assistance and influence with the Government. You are, no doubt, aware that a universal feeling prevails in this city, that a remedy must be found for the grievous annoyance caused by the effluvia arising from the Liffey at low water. The great improvements made by the Corporation in the drainage of the city, by the formation of fifty miles of new sewers since 1851, has, of course, increased the necessity for the formation of intercepting sewers; added to this, the fact that a number of hospitals, six barracks, and several other public institutions, as well as some of the adjacent townships, are drained into the Liffey, all of which tend to render the river obnoxious to the health and comfort of the

city. The Corporation have had this important subject before them for some time past. They have had plans for the construction of the necessary works from Mr. Bazalgette, the engineer of the Metropolitan Board of Works; their own very able engineer, Mr. Parke Neville; and from several other parties of knowledge and experience with respect to such works. The Corporation, however, find that they are met at the outset by difficulties of no ordinary kind. In the first place, works of the extensive character required could not, they apprehend, be carried out without an Act of Parliament, conferring the required powers upon the Corporation. Secondly, the Corporation have no funds at present that could be legally applied to pay for these improvements, and they have not sufficient powers to levy a special rate for the purpose. Thirdly, as the plans of Mr. Bazalgette, as well as those of the city engineer, contemplate the outfall of the entire city sewage at the north side of the city of Dublin, there is every reason to believe that this arrangement will evoke a very considerable amount of opposition. Fourthly, as some important questions have arisen in London between the conservators of the Thames, some of the inhabitants of Barking, and the commissioners for the construction of the intercepting sewers, the Corporation are most anxious that the Government will appoint an engineer of eminence to examine the various schemes for the purification of the Liffey, as well as to matters and things having reference thereto, so that, when the Corporation go before Parliament to promote their bill, the report of such commissioner would sustain and support them against any opposition that might be offered. It is most respectfully added that, whilst the members of the Municipal Council, so far from ignoring their responsibility in carrying out works so imperatively called for, are ready to incur any amount of accountability in discharging their duties, yet they cannot help entertaining a strong conviction that, in promoting great and extensive works of this character in the second city of the empire, they have a right to hope for every assistance from the Executive Government of the country."

The Chief Secretary—I do not think that the Government can be expected to undertake, under the present circumstances, the responsibility of such legislation, and I do not understand that such is asked. The immediate object is to obtain from Government the appointment of a first-rate engineer as a Royal commissioner. You have already had a report from the gentleman who is said to be the most eminent engineer upon these subjects—Mr. Bazalgette. I do not see whom the Government are likely to be able to select who would be a higher authority on the subject than he. I presume the Royal commissioner should be an engineer, and he would have to pronounce on the schemes.

Mr. Norwood said the commissioner would hear evidence *coram populo*, and have an opportunity of hearing the opposition that might be made to any of the schemes. An important consideration was the relative proportions of contributions which the outlying townships should pay towards the work, and this the Corporation had no means of ascertaining at present.

The Chief Secretary said what Mr. Norwood had mentioned had made out a very important difference between the report that would be procured from the Royal commissioner and the opinion that was procured from Mr. Bazalgette. It is plain that there would be important matters to be decided not of an engineering kind, and the question arises whether an inquiry, conducted by a single engineer, would be satisfactory?

Mr. Norwood said that if legal rights were to be ascertained, and the question of proportion of contributions settled, perhaps it would be necessary to have a legal person associated with him.

The Chief Secretary—Previous to my laying this matter before the Home Secretary (who is the member of the Government who would personally have to deal with it), which I shall be very happy to do, I should like to know from the deputation, or, after this day, from the Council, the kind of commission which they would make up their minds to apply for, if there was any doubt on their minds. As the question is not one of mere professional engineering, it is a matter for consideration whether it would be satisfactory to have the inquiry by an engineer alone. Perhaps it would be as well if that matter were talked over.

THE COLOSSEUM OF ANCIENT ROME.*

THERE were three species or kinds of games, in which the early Romans took delight, performed in the theatre, the circus, and the amphitheatre.

1st. The scenic, as exhibited in their theatres; buildings so constructed that the benches or seats fronted the stage or place of performance, which stage was temporary wood. We have undoubted proof that the plays of Plautus and Terence, the celebrated comic poets of Rome, were performed on temporary wooden stages. The Athenians in Greece at first had only a wooden scaffolding on which their dramas were performed. Such wooden theatres were only erected during the Dionysiac festivals, and afterwards pulled down; and on the occasion of the first drama of Æschylus, 500 B.C., the scaffolding broke down. To prevent the occurrence of such an accident, in Greece, a stone theatre was forthwith built on the descent of the Acropolis. The Grecians always built their theatres on eminences, or on the slope of a hill. These theatres displayed great skill in their acoustic and perspective arrangements all over Greece, resembling each other in the main points. The Attic theatre, like all the Greek theatres, had the place for the spectators in the upper or north-western part, the stage in the south-eastern, and between the two was the orchestra. The Romans must have become early acquainted with the Grecian theatres, for they also erected theirs in similar sites on the sides of hills: this is perceptible from the ruins of very ancient ones at Tusculum and Fesulæ, but in the city of Rome they had not a stone one till comparatively a late period. The Romans followed the Greeks in the semicircular form of theatre. The back of the stage was ornamented and painted to correspond with the piece to be performed, whether comedy, tragedy, &c., at the former of which women were not permitted to be present. The rear part of the stage was closed by a wall called the *scena*, from which, on each side, a wing projected called the *parascenium*. The whole space from the *scena* to the orchestra was termed the *proscenium* or real stage; that part of it where the actors stood when they spoke was the *logeum*, in Latin *pulpitum*. B.C. 68 the tribune, L. Roscius Otho, had a rule made regulating the places in the theatre for the Romans, so that fourteen *ordines* of benches were assigned as seats to the *equites*; they were close behind the seats of the senators and magistrates.

2nd. Games and plays as performed in the circus, where the spectators stood round to see the performance or view the race or procession as it moved round in a circuit. When Tarquinius Priscus took the town of Apiolæ from the Latins, he commemorated his act by races and pugilistic contests in the Murcian Valley, around which each one raised a stage for himself on which he could stand and view the games, the whole being called a circus. Previous to the death of Tarquin a permanent building was erected, with regular tiers of seats; this building was afterwards called the Circus Maximus, to distinguish it from the Flavian and other similar buildings. Of the Circus Maximus scarcely a vestige now remains; but the ground plan of the small circus on the Via Appia is in a state of considerable preservation. The Circus Maximus was capable of containing, according to Dionysius, 150,000; according to Pliny, 260,000; and as stated by Victor, 385,000—all probably being correct at different periods of its history. At first there were invidious distinctions of seats, but in the latter days of the Republic all classes sat promiscuously in the circus. Lists of the horses, with their names and colours, and those of the drivers, were handed about, and heavy bets made upon each; and sometimes the contests between two parties broke out into open violence and bloody quarrels.

3rd. Games and contests as exhibited in the amphitheatre; and it is in order that I may give you some account of the greatest of these amphitheatres—the Amphitheatre Flavianum, commonly called the Colosseum—that I have the honour to appear before you this evening. Amphitheatres in general were covered buildings of spacious dimensions, elliptical in form. A theatre proper has but a semicircle of seats before the stage, whereas an amphitheatre has the place of performance entirely surrounded by seats, and hence its name, "*amphi*," being Greek for *both*, on both sides, front and rear. At an early period amphitheatres were temporary and constructed of wood, but of enormous size. Tacitus says there was one at Rome in the reign of Tiberius capable of accommodating so many that, on its giving way, caused the death or injury of 50,000 persons. The amusements, as they were considered, exhibited in the Colosseum were very popular among the Romans, particularly in the time of the decline of the Republic. The saying of the satirist, Juvenal, "*panem et circenses*," that all a degenerate Roman sought was bread and the circus or amphitheatre and its games; so that those who desired popularity had but to supply this popular want. A building of great size was thus needed and supplied, while the taste for these performances at Rome spread to the provinces, and large amphitheatres were erected in the great towns of Italy, such as Capua, Verona, Pompeii, &c.; and at Arles and Nismes in France; and in Cirencester, Silchester, and Dorchester, in England.

I wish it were possible to convey a just idea of the size of the amphitheatre called the Colosseum. The Ulster Hall, the largest building here, for instance, seats 2,500, but the Colosseum seated 87,000, and Lepsius says it also afforded ample standing room for 22,000 more. The building itself is oval, and covers six acres of ground. The major axis of the ellipse is 620 feet, the minor 513 feet, through the walls. The central portion, styled the arena, is also oval, its major axis being 249 ft., and the minor 151 ft. The height of the outer wall is 157 ft. We can thus easily understand how it came to be called "The Colosseum," its original name having been "The Flavian Amphitheatre," so called from the three emperors of the Flavian family—Vespasian, who commenced it; Titus, who nearly completed it and dedicated it with sumptuous games, A.D. 80, when 5,000 wild beasts were slain in the arena, the plays having continued for about 100 days; and Domitian, who entirely finished it. We often read, however, that Titus had the honour of erecting it from his having built the greater portion, and dedicated it.

As regards its popular name of Colosseum. Colossus is a word of unknown origin; it is used by Greeks and Romans to signify a statue larger than life, but, as such statues were very common, the word is more immediately confined to something of gigantic dimensions, such as the bronze colossus at Rhodes, the height of which was 90 ft.; the colossus of Nero, executed in marble, of the enormous height of over 110 ft. From this latter some consider the name colosseum is derived, as both were in the same vicinity and contiguous to one another. It is not to be supposed, from the meaning of the word, so immense an edifice as the Colosseum should take its name from any statue, however great, which was yet but a small thing in comparison with itself, so deriving its name from its own immense size, the colossus among buildings being the largest ever erected, and fortunately its ruins are best preserved to this day. Suetonius says, in Caligula's time it was called Colossus, from its immense size and beautiful form; and as Vitruvius calls "immense weights colossal, gigantic statues colossii," so might the Amphitheatre Flavianum be called a colossus among buildings from its own great size without any necessity of taking its name from any other thing.

Roman amphitheatres, as well as the Flavianum may be classed in parts under two divisions:—the external, divided into arcades,

corridors, and stairs; the internal into the arena and cavea. The arena was an open space in the centre (so called probably from the Latin word for sand, being covered with sand or sawdust during the performance), and had four principal entrances—two at the ends of each axis,—to which passages led directly from the exterior of the building, besides secondary ones between them communicating with the corridors under the seats. In the Greek theatres the seats for the spectators were in most part cut out of the rock, and consisted of two rows of benches rising one above another, the rows forming parts of concentric circles, divided into compartments by passages between them, where, in a crowded house, persons might stand. There were stairs across the rows in straight lines; the stairs in the next rows were between the two rows of the lower stairs—by this means the compartments looked like cones with the tops cut off, hence they are in Latin called *cunei*. The whole of the place for the spectators was called in Latin *cavea*, being generally a real excavation of the rock. The *cavea* may be subdivided into the *podium*, *præcinctiones*, and *menianum*. The podium was a wall round the arena 15 ft. high, faced with marble, with a covered gallery surrounding the arena set apart for the emperor, the vestal virgins, and persons of the highest rank, above which were raised three divisions of seats called the *præcinctiones* or landings at the top of the first, second, and third *menianum*, in the pavement of which landings were grated apertures at intervals to admit light into the vomitoria or entrances beneath them. The first *menianum*, or slope of benches, was appropriated to the equestrian orders, the seats of which were covered with cushions; then, after a *præcinctio*, with several landings from the stairs terminating in it, was the second *menianum*, for the *populus*; then the second *præcinctio*, bounded by a wall, over which was the third *menianum*, so called from the inventor of its wooden seats, where the general public or plebs, covered by a portico, sat and viewed the games; and lastly, the colonnade, which contained seats for women. The narrow gallery round the summit of the interior was for the attendants who worked the velarium, or awning, by which the building was covered. Thus each of the three ranks—senators, knights, and people—had their own places. Thus there were four tiers of seats corresponding to the exterior four storeys; the first tier had 24 rows of seats, the second 16 rows, they being separated by a high wall from the third story, which contained the *populus*, consisting of 25 rows. The entrances were through low apertures called vomitores, access being up or down to the *cunii*, or compartments of seats, which were so arranged as to converge to the centre of the amphitheatre, and diverge toward the walls of the building, with passages between them from the centre. There were two main entrances in the greater axis, two in the lesser axis, and eighty entrances for spectators; twenty-three to fifty-four, all numbered, are still remaining. Each class had twenty entrances. The means of exit were so skilfully arranged that the entire multitude occupying this vast space could be dispersed in less time than the Ulster Hall could be cleared of its contents.

Externally it consists of four storeys or ranges of columns,—1st, Doric; 2nd, Ionic; 3rd, Corinthian, above which is a fourth row of Corinthian pilasters. Between the columns there are arches forming open galleries throughout the building, and between the alternate pilasters of the upper row are windows to give light to the *menianum*, with statues in each opening. There were 240 holes and corbels for the velarium or covering of this immense edifice (which is even yet comparatively entire). The velarium was a temporary awning or wooden roof which screened it from the sun and rain, but how it was fastened and managed has raised many antiquarian conjectures.

The chief of the purposes for which the Colosseum was used was the combats of gladiators, which were instituted and main-

* By Shakspeare Wood, Esq. Read at meeting of Belfast Naturalists' Field Club. Prof. Thompson, C.E., in the chair. [The right of reproduction is reserved by the author.]

tained less for the purpose of gratifying the spectators than of being sacrificial offerings for the dead, and which purpose was known to exist so early as the time of Homer. The candidates for civic honours, also, were accustomed to seek these by rendering themselves popular by means of gladiatorial combats and exhibitions of wild beasts. It was mainly for the latter that the Colosseum was intended; and it is well known that Vespasian—whose simplicity of life, forming a striking contrast with the profuse luxury of some of his predecessors, very much reformed the morals of Rome—was not favourable to gladiatorial combats. That it was not for gladiatorial shows only is proved by the fact that Achilles was pleased to sacrifice twelve Trojan youths to the *manes*, i.e., in memory of the departed soul of Patroclus. And gladiators in this way were exhibited at Rome so early as B.C. 264, in the Forum Barium by Marcus and Decimus Brutus, at the funeral of their father. At a later period this purpose was effected by a combat allowed between persons taken in battle, endeavouring to save their own lives in the amphitheatre by killing their adversary. The antiquity of the practice is very great, as proved by the Etruscan tombs. The *ædiles*, *prætors*, *consuls*, and above all candidates for office purchased the people by these barbarous entertainments, so that it was a practice from early times for persons desiring election to propitiate the people; and we see even in our own time the thing not so improbable in the bribery and corruption often used, but yet very difficult now. See the popular gigantic concerts that are given, the steeplechases and great prizes, sometimes the bribing a whole town *en masse* by building some edifice for the use of the townspeople. I speak, of course, as a citizen of the world, as a foreigner.

I mentioned the Forum. The forums in Rome differed from those in Greece, and were at first open spaces where men met to transact business; they afterwards became places of exhibition for the populace, of delivering learned addresses to the people, and occasionally for gladiatorial combats and shows of wild animals called *Venatorium*, being the name given among the Romans to an exhibition of wild beasts, which fought with one another and with men.

Victorious Roman generals were accustomed to bring back with them wild animals, the combats of which were at first exhibited in the circus, but proved dangerous to the spectators. Pliny records the fact of elephants and other wild animals being so exhibited in the circus by Maximus during Pompey's triumph, and the danger thence arising. Various devices were resorted to in order to guard against this danger, and ultimately it became necessary to erect a special edifice for the purpose.

Having thus given you a brief description of the Colosseum, it may not be uninteresting if I give you some account of the origin of these buildings, of which the Colosseum or Flavian Amphitheatre was the greatest. The erection of the first of these buildings is due to Julius Cæsar (described by Dion Cassius), and was built of wood. He also built a hunting theatre of wood, called an amphitheatre from having seats all round, without a stage. This shows how the edifice and its name originated, and the same historian adds that Cæsar, in these dedications in honour of his deceased daughter, exhibited to the people *massacres of animals* and combats of men, thus indicating the double use to which the amphitheatre was destined, and which it was afterwards to serve. He diverted the people during his *ædileship* with 320 couples of gladiators. Trajan continued an exhibition of this kind for 123 days, during which time he brought out 1,000 pairs of gladiators. The number of *escaped* gladiators on one occasion was so great that, heading the slaves, they created a war which was put down only by the great Pompey himself, Cassius not being able to subdue them. Nero is related to have brought over 400 senators and 600 knights upon the arena; but Augustus made a law that no senator

should engage in these games. By the will of Augustus, successor of Julius, he caused 3,500 wild beasts to be slain for the gratification of the populace.

The first idea of the erection of an amphitheatre of stone originated with Augustus, but who, however, did not execute it. A Roman citizen, Stabilius Taurus, is said by Dion Cassius to have been the first to erect at his own expense a *hunting theatre* of stone in the Campus Martius, which he dedicated with a fight of armed men. Such a theatre was praised as a novelty, but was not sufficient for the requirements of Rome; and for some great exhibitions given subsequently, erections of wood were employed by Hadrian in the Campus Martius. On Pompey built the first *stone theatre* at Rome near the Campus Martius. It was of great beauty, built after the model of that of Mytilene; it contained about 40,000 persons; and, in honour of the Prætorship of Drusus, there were great exhibitions given. Previous to the death of Tarquin, a permanent building was constructed with regular tiers of seats in the form of a theatre—to this the name of Circus Maximus was afterwards given. Of the Circus Maximus scarcely a vestige now remains; but there are the remains of a small circus on the Via Appia, the ground plan of which is in considerable preservation. On one occasion of aquatic games by Augustus there were thirty-six crocodiles shown. There were occasionally sea fights introduced into the amphitheatre, sufficient water being let in to float small ships. The combatants were generally captives or criminals condemned to death, who fought as in gladiatorial combats until one party was killed or pardoned by the emperor. In Nero's *naumachia* (for that was the name given to the sea fights) there were sea monsters swimming about in the artificial lake. In the sea fight exhibited by Titus there were 3,000 men engaged, and in that exhibited by Domitian the ships nearly equalled in number a real fleet. There were several small amphitheatres and of inferior construction, needing no special notice; but the limited capacity of the ordinary stone amphitheatres, the continual necessity of constructing temporary ones from time to time, moved the Emperor Vespasian to undertake the erection of the Colosseum, that portent of buildings, a vast amphitheatre of stone, and wonderful construction, nearly perfect to this day, inspiring intense wonder when we contemplate the stupendous fragment still remaining of it, as it inspired in the seventh century the awe and admiration of the Saxon pilgrims, who, in their wild enthusiasm broke forth in the sublime proverbial expression recorded by the Ven. Bede—"While stands the Colosseum Rome shall stand, when falls the Colosseum Rome shall fall, and when Rome falls, the world. From our own land thus spake the pilgrims o'er this mighty wall." There is a current tradition—rendered very probable by the discovery in the sixteenth century of an ancient inscription, preserved by Arringhi,—that the architect of the Colosseum was a Roman named Gaudentius, who afterwards became a Christian, and perished by martyrdom therein:—

"Sic premia servas Vespasiane dire
Premiatus es morte Gaudenti letare
Civitas ubi glorie tue auctori
Promisit iste dat Christus omnia tibi.
Qui alium paravit theatrum in celo."

I will now speak further of some of the most remarkable exhibitions of wild beasts given in Rome; the first on record on the occasion of the victory of Lucius Metellus over the Carthaginians in Sicily in the year B.C. 252, or 502 from the building of Rome, when 142 elephants were exhibited in the circus; these he had brought from Sicily after his victory over the Carthaginians. The elephants did not fight, being only killed, the Romans not knowing what to do with them. The first time they were made to fight was B.C. 186, in the games of M. Fulvius, in fulfilment of the vow he made in the *Ætolian* war; in these games lions and panthers were exhibited. Elephants were first made to fight in the circus, in the *ædileship* of Claudius Pulchras, B.C. 99, and

for twenty years after they were made to fight against bulls. The fights of other animals were only held after the second Punic war, when Carthaginian Africa, the protectress of many kinds of wild animals, was reduced to a kind of slavery; but the first mention of such combats in Roman history is in the year 568, when Marcus Fulvius celebrated, with greater magnificence than had ever been seen before, the games promised, as above stated, for the *Ætolian* war. Livy relates that, added to various other things seen for the first time in Rome, there was given a hunt of lions and panthers.

Twenty years after, the magnificence of the circensian games having begun to increase, sixty-three panthers were exhibited, forty bears, and some elephants; and luxury and riches increasing by degrees, Marc Scaurus, in his *ædileship*, B.C. 58, exhibited 150 tigers, five crocodiles, and a hippopotamus. Sylla took 8,000 prisoners from the city of *Atenæ* to Rome, and caused them all to be massacred in the circus about 80 B.C. Sulla, in his prætorship, gave a fight of 100 lions, then for the first time let loose into the arena, and shot at by javelin men sent by King Bocchus; before this they were chained. But Pompey the Great so far surpassed all preceding magistrates in the games, B.C. 55, to celebrate the dedication of the temple of Venus Victrix, after all the other entertainments given by him to the people the last five days were spent in these hunts, wherein 410 tigers, 500 lions, a lynx, a rhinoceros, and other strange animals were slain, shot at with arrows by men from Africa. Cæsar, B.C. 45, also divided hunts into five days, following this example by games given because of the civil war, and introduced for the first time a *cameleopard*. At the close of one such exhibition, when the combats of gladiators with wild beasts were introduced, 500 men on foot were engaged, 300 horsemen, and 20 elephants with towers on their backs, each defended by 60 men.

Under the emperors there was a sort of exhibition sometimes, in which the beasts were not killed, but after a time given up to the people, who were allowed to rush in and carry off what they could. On these occasions large trees were planted in the circus, to make it look like a forest, and the more savage animals were excluded for the time, or used in the amphitheatre. Probus gave an exhibition of this sort, 1,000 ostriches, 1,000 stags, 1,000 boars, 1,000 deer, and many other animals were shown. In the day after this exhibition in the circus by Probus there were slain in the amphitheatre 100 lions, 100 lionesses, 100 Lybian and 100 Syrian leopards, and 300 bears. Of Augustus the records we have of his will tell us that in entertainments given by him 3,500 animals were slain. You can easily imagine, then, the danger arising from exhibitions of this kind given in circuses in animals attempting to break through the railings, and the necessity for building edifices for the purpose. Dion Cassius records that the dedication of the Colosseum by Titus lasted 100 days, as already mentioned, during which numbers of eagles were made to fight, and that altogether, with wild animals and tame, 9,000 were slaughtered.

I should take up too much of your time if I were to pass in review all the records the Roman historians have left us of these exhibitions as displayed in the Colosseum. I shall content myself with naming one or two of the most remarkable. Hadrian's lasted for six days, in which were killed 100 lions and as many lionesses; altogether 1,000 animals. From the life of Gordian III., by Capitolinus, we learn that he had at one time for exhibition 30 elephants, 10 elk, 10 tigers, 60 lions, 30 leopards, 10 hyenas, 19 giraffes, 20 zebras, and 40 wild horses, and that he maintained more than 1,000 pairs of gladiators. All those animals were consumed by his successor, Phillip, in the famous secular games when the 1,000th year of the city was celebrated. I shall finally mention the hunts given by the Emperor Probus when he celebrated his triumph in the year A.D. 281. Holpiscus, in his life, narrates that on that

occasion 100 lions rushed at once into the amphitheatre, and their roars resounded through the building like thunder. Then there was a hunt of 100 African leopards, 100 baboons, and 300 bears altogether. The biographer tells us, however, that the sight was rather magnificent than pleasing. One may well wonder how such enormous numbers of animals were obtained. The Romans were the masters of the world, and had hunters in all parts; no person was allowed to *catch* or *kill* without licence. Their game laws are still to be wondered at, and they placed no limit to their undertakings. Their obelisks even were many and curious, as, for instance, that erected on the Campus Martius by Augustus, which served to mark the hours on a horizontal dial drawn on the pavement. Their statues, too, were numerous, many of them colossal. Among the antiquities of Rome are seven colossal statues—two of Jupiter, two of Apollo, one of Nero, one of Domitian, and one of the Sun.

But the exhibitions of wild animals were not always mere massacres and hunts: a scenic character was often given to them, and it is fabled of Orpheus the Grecian that with his lyre he enchanted the wild animals, drawing them after him with the music of his golden harp. Sometimes they were domestic with wild animals trained not to hurt them; and sometimes so mixed as to constitute a "happy family." Martial, in the first book of his epigrams, gives an account of a hare pursued by dogs, which took refuge in the mouth of a trained lion. The men who belonged to this class of gladiators were armed magnificently and performed various feats on horse and foot, rushing on the animals, attacking them with arrows and spears, showing the utmost dexterity and courage. But in the real hunts the animals were made to fight in earnest, and so were the men. The bull fights were engaged in by men of servile or free condition. Some entered voluntarily on the profession and were taught for it, others were refractory slaves or public delinquents; under this last head were condemned Christians, martyrs, in vast numbers, whose blood was shed on the arena of the Colosseum. Sometimes the delinquents had liberty to fight, sometimes they were bound: amongst the foremost of the latter was Ignatius, Bishop of Antioch, Trajan having thus made him the food of wild beasts A.D. 107.

I will not take up time by giving histories of martyrs: as much about them is legendary, though much is true. Such scenes existed until the time of Constantine, when Christian martyrdom in this way ceased. While the gladiatorial battles with wild beasts were moderated by removing some of the cruelty, yet so they continued till the fourth and fifth centuries. The last we have mention of are those written of Cassiodorus. Thus they lingered on till the reign of Theodoric the Great, A.D. 519-523. The bloody spectacles of gladiatorial combats are said to have been finally put an end to by the self-dedication of Almachus, or Telemachus, a pious monk from the east, who, in holy zeal on his coming to Rome in the year 404, went into the arena of the amphitheatre when the crocodiles, gladiators, &c., were in full antagonism, trying to prevent such cruel sport, and was himself cut down and stoned by the bystanders. This scene produced such a revulsion of feeling that the Emperor Honorius was so wrought upon by the death of this voluntary martyr that he abolished those cruelties by a decree, which was only partially obeyed. But Telemachus was, it appears, the last martyr there, though the practice in the west was not entirely abolished till it was done by Theodoric, King of the Ostrogoths, in the year 500.

It is difficult to name the date when the partial destruction of the noble building itself commenced. It was intact in Bede's time—about A.D. 700. The noble Roman houses, such as the Orsini, the Colonna, the Franjipani, effected a destruction which the Goths and Vandals are wrongly accused to have accomplished—building their palaces from the walls of the Colosseum. Possibly it was not wilfully torn down, but the stones—fallen

by shocks or time—being taken away, and those loosened also taken, and so the work of destruction continued till even Michael Angelo—who was in this respect both Goth and Vandal—did not scruple to build the Farnese Palace from the same material, A.D. 1526. Thus was the Barberini Palace built in 1640, and the Cancellaria in 1494. An attempt, but a disastrously abortive one, was made in 1332 by the Roman nobles to revive the exhibitions in the Colosseum in the shape of bull fights. The preparations were on a magnificent scale, and under the patronage of ladies. Bulls were fought by the young Roman nobles gaily dressed, wearing different colours, their ladies' favours, and distinguished by mottoes, as, for instance:—

Mezzo Astalli—Black (his young wife just dead)—"Thus disconsolate I live."

Galeotto Malatesta da Rimini—Green—"I only am like Horatius."

Giovanni di Marsi—Grey, or cinder color—"Under the cinders I burn."

Savello d'Arragni—Yellow—"Let all beware of the folly of love."

Agapete Colonna—Dark Grey—"If I fall, ye spectators will fall also."

This was a grand show, after great preparation made, but it ended most fatally, and plunged many of the noble families of Rome into mourning. There were eighteen combatants killed, nine wounded, and only eleven bulls. The experiment was not repeated, till an attempt was made in 1671, after which all licence for it was withdrawn.

Several of the Roman pontiffs endeavoured to utilize the Colosseum, but without success. Sixtus V., a man of great talent and energy, studied the wants of the people, put down extensive brigandage, and lives still in popular memories. He built an aqueduct, which bears his name, and applied the Colosseum to commercial uses. A century later, Clement XI. enclosed the lower arcades, and converted a portion of the building into a manufactory of saltpetre; in this capacity, and of a woollen manufactory—the arcades being shops—all proved failures.

It is gratifying, finally, to find that the appreciation of ancient monuments, though not of commercial importance, is reviving, and steps were taken to save the Colosseum from further ruin. Benedict XIV., in 1750, converted this vast monument of Pagan antiquity to Christian purposes, by dedicating it to the memory of the Christian martyrs. It has thus continued to the present day, and Pius VII., at enormous outlay, strengthened with buttresses some of the falling exterior walls, and so preserved it. It has since been visited by Christian pilgrims of every creed as among the most sacred spots of earth, and consecrated to the memory of many, though from among the humblest, yet most truly heroic of the human family.

LAW.

THE PHIESBOROUGH CHURCH CASE.

THE second trial of the celebrated case of *Doolin v. Dixon* was set down for hearing on Monday last in the Court of Exchequer, before the Lord Chief Baron. We understand that arrangements have been come to by which the matter will be submitted to arbitration.

HOFFMANN'S ANNULAR KILN OR OVEN.

In passing along the Kingstown railway, numbers of people are struck with a strange erection beside the line, at the point where the railway passes over the Grand Canal Docks. The building, which in appearance is somewhat like the shape of a man's hat with a chimney rising out of the middle of it, is one of those famous Hoffmann kilns or ovens for burning bricks, lime, or cement, which are spread over Germany, and are fast extending in England, Scotland, and Wales. A model of this kiln was exhibited by Mr. Arthur M'Hugh, of 10 Foster-street, Dublin, the agent, at the Royal Agricultural Show in

Kildare-street, and since then the invention appears to have received considerable attention, and we understand that additional kilns on the same principle are being now put up in Ireland.

For some years past a magnificent Hoffmann kiln for lime has been working, as is known, at Castle Espie, near Comber, Co. Down, the property of Samuel Murland, Esq. From this latter kiln, which is capable of turning out from 90 to 100 tons a-day, large quantities of lime are exported to Scotland; and it appears that Mr. Murland is so satisfied with the results of his enterprise in this respect, that he is about having another large kiln for brick-burning erected on the same principle, he having abundance of the finest brick clay on his property. At the present moment, too, it may be worthy of remark that bricks made at Mr. Murland's works are being largely imported into Dublin; and with the aid of the Hoffmann about to be erected at his works, it is expected a most superior article will be brought into this market. The Belfast bricks of the same kind made in the Hoffmann kiln of Mr. John Moore are well known in Dublin, and are generally admitted to be superior to the best Bridgewater; but of late years Mr. Moore has had so good a sale at his own door as to prevent him sending bricks here. We mention these few facts to show the vast importance of Irishmen adopting all kinds of valuable inventions by which manufacturing capabilities are increased, and by which we are placed on a level with other countries, and probably few things are so well calculated to do such service as the Hoffmann oven.

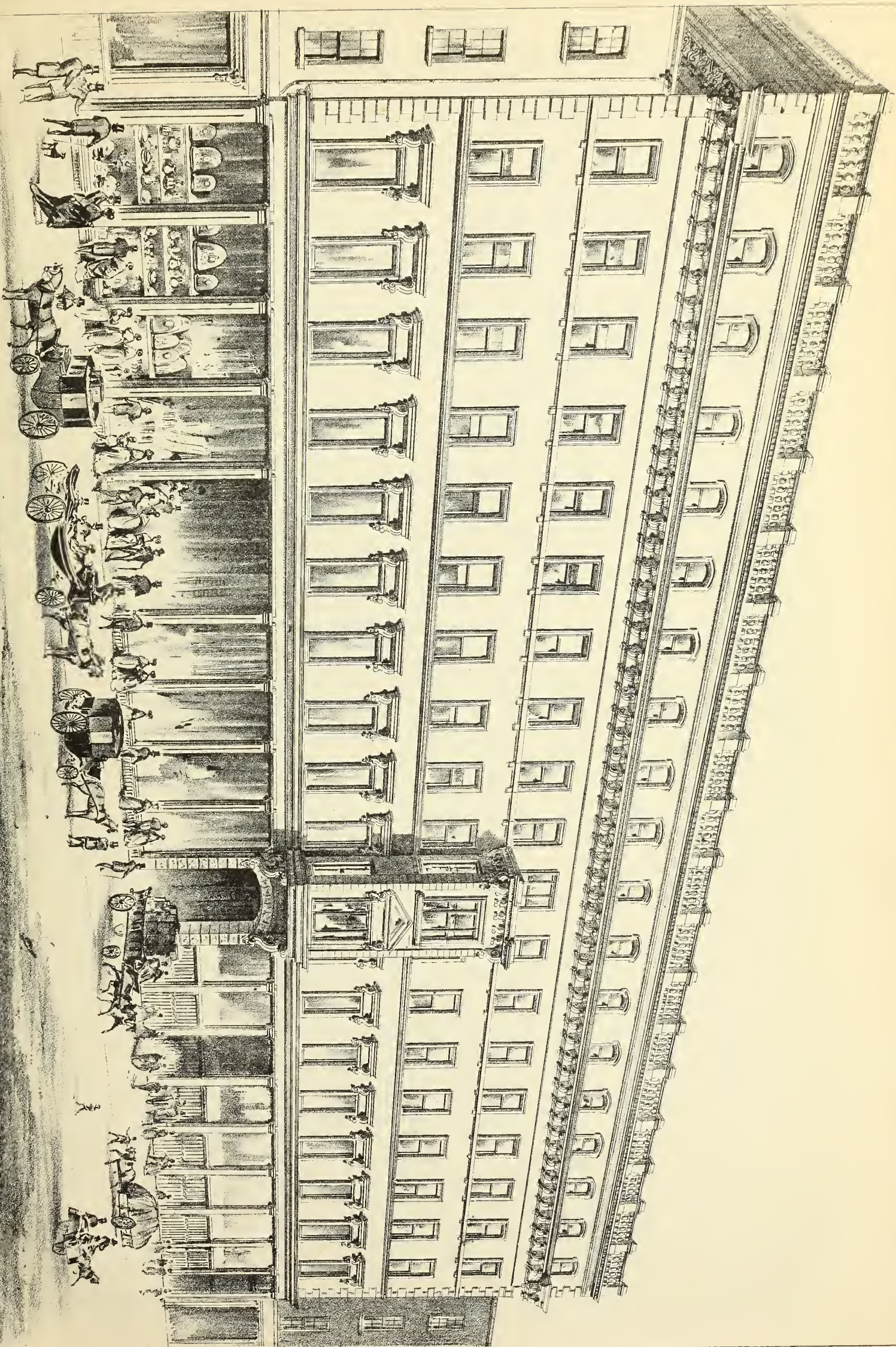
It has been heretofore said by one of our leading and most scientifically practical men, that he would be a great benefactor to Ireland who could devise a means of cheapening the cost of fuel for manufacturing purposes, which very thing is most effectually done by the Hoffmann invention, and which saves two-thirds of the cost of fuel in the production of lime, and so much as three-fourths in the case of brick burning. Should this representation be any way correct, we have at once provided a great instrument for reducing, in the first place, the cost of building in Ireland, and, in the next, for producing immense quantities of lime for agricultural and other purposes. The Boston Lime Company, for example (the owners of the Dublin kiln), have already made arrangements for sending down by the railway, into which they have a siding, large quantities of their manufacture to the prosperous towns of Kingstown and Bray, as well as to the counties of Wicklow and Wexford; and which will, doubtless, cause a great change in existing arrangements. It will, for one thing, most likely prevent any more limestone being sent from Howth, &c., across the bay to be manufactured into lime on the Wicklow side.

The Dublin kiln is strongly and tastefully built, and reflects much credit on Mr. C. E. Bagnell, under whose superintendence it has been erected.

We understand that orders for inspecting the kilns in England, Wales, Ireland or Scotland, can be had on application to Mr. M'Hugh.

THE EXCAVATIONS AT JERUSALEM.

THE third quarterly statement of the Palestine Exploration Fund, recently published, contains an account of discoveries as important as any that have yet been made. Having thoroughly examined the old Haram wall at the south-west and south-east angle, Lieut. Warren has been exploring the north-east angle. Here he finds the old wall—that portion of it below the ground—continued beyond the apparent line of division above ground; the Pool of Bethesda, which he had already ascertained to be a real reservoir, concreted and plastered at bottom, has an overflow through a very remarkable chamber made of wrought stones inside the wall: the stones are cut similarly to those at the south-east angle, but not, apparently, so carefully; characters were found on them, copied, sent home, and examined. They are pronounced



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to be similar to those previously read by Mr. Deutsch, and Phœnician. But the shaft has yielded other and, perhaps, more important results. On reaching the rock, which was 110 ft. below the surface of the ground, it was found to be sloping downwards at an angle of 3 in 10. A valley, therefore, previously suspected by some, the lowest point of which has not yet been reached, runs across this corner of the Haram area. And the platform of the dome of the rock is at least 165 ft. above one part of the valley in the northern part of the Haram area. Among other results which might be mentioned we may name, therefore, this. The Haram area, on one part of which once stood the Temple, may now be compared to the lid of a box, of which the walls are the sides. Its corners are respectively the S.W., about 120 ft.; the S.E., about 100 ft.; the N.E., about 130 ft. above the rock. At the south-east corner are substructures, long since known, called "Solomon's stables." Are there none at the other angles, and, if so, of what kind are they? All questions relating to the inside of the Haram area must, however, be postponed till permission can be obtained to dig there. Lieutenant Warren and all his party have been obliged to retire to the Lebanon to recruit their health. They return, it is expected, at the end of this month, when it is to be hoped that the requisite funds will be in the hands of the committee, at their office, 9, Pall-Mall East, to carry out the work of excavation, which now approaches completion.

ON THE LAWS OF TEMPESTS.

THE word tempest may be used to include all such atmospheric disturbances as are known by the terms gale, storm, cyclone, or hurricane. The knowledge collected concerning these meteors has only been systematised within the present century. The rapid extension of navigation and consequent impetus given to commerce rendered it imperatively necessary to grapple with the mysteries of the tempest, to watch and register its signs and details, its characteristics and its results, to generalise these data, ascertain their laws, and found a system or science capable of connecting them in relation of cause and effect. The system so gradually developed may be termed the Law of Tempests. It is a science elaborated by philosophers, but already it has become an art whereby seamen are enabled to prepare for or to baffle the tempest, or, under suitable circumstances, to reap the full advantage of its force.

Romme, in France, studied the records of tempests in various parts of the world, and arrived at the induction that the wind in storms has a circular character; in short, that they are whirlwinds. Then followed Capper in England, Brande in Germany, and Redfield in New York, who established the law that a tempest is a progressive whirlwind—that the whole meteor moves outward rectilinearly while it is revolving on its own axis. Redfield, indeed, went much further, and stoutly maintained, although he was without means to prove it satisfactorily, that all winds are controlled by the same law of rotation. Dové, in Germany, has succeeded, by the help of the law of gyration, in referring the trade winds, the monsoons, and the so-called variable winds to one common general principle, which Hadley had first applied to explain the origin of the trade winds. Sir W. Reid demonstrated the law of rotation, and established that, in the northern hemisphere, the storm wind turns from right to left, whilst, in the southern hemisphere, it turns from left to right. These, briefly stated, are the fundamental laws of the tempest. The laws relating to the tracks of cyclones in the torrid zone, the curvation of the track near the tropics, and poleward path through the temperate zone, have not been conclusively established, and, as being of less importance, this allusion to them may suffice. Piddington, Thom, Lloyd, Fitzroy, Ballot, Le Verrier, and many others have, by their investigations, tended to confirm and develop the science of storms. Sir John Herschel has also theorised

upon storms with the lucidity characteristic of his writings. He says of cyclones or revolving storms "that they are in the nature of vortices or circulating movements, participated in by masses of air of from 50 to 500 miles in diameter, revolving the more rapidly the nearer the centre, up to a certain distance or radius, within which there is a calm. The place of this centre of rotation meanwhile advances steadily along a definite line upon the globe, with a velocity varying from two to thirty or forty miles an hour, or even more."

Tempests are accompanied by great oscillations of atmospheric pressure as exhibited by the barometer. It is during tempests that the mercury in a barometer undergoes its greatest depression, falling with the first part of the storm and rising with the latter. Synchronous observations made upon storm tracks have shown that the pressure at or near the centre of the whirlwind or storm is the least. Hence the barometer falls while the storm centre is approaching towards it, and rises as it recedes from it. To epitomise—the laws of tempests are that gales, storms, and hurricanes are masses of air whirling round a central nucleus while advancing bodily onwards; that the greatest force of wind is at a comparatively short distance from the central nucleus, which is itself a calm; that under the nucleus the barometer is low, being higher the nearer it is to the circumference of the meteor; that they revolve against the sun in northern latitudes, and with the sun in southern latitudes.

Admiral Fitzroy's experience led him to assert that:—"It is sometimes found that cyclones, instead of passing horizontally or parallel to the earth's surface, are inclined at an angle (more or less acute) with the horizontal plane, and we, therefore, feel only parts of them; there may be several such circulations passing or following in the same direction, and revolving similarly, like eddies, with their lower portions, on one side only of the circulating meteor, touching the earth's surface, the other parts circling above our heads, so that we only feel a part of the change; and not the whole of the movement." No gale ever blows upon the coasts of the British Isles violent enough to involve danger without acting upon the barometer, and if the barometric indications were studied and attended to, the disasters to shipping during storms would be lessened. The barometer is a thoroughly scientific instrument, simple in construction, and can be readily used, but it is necessary that its indications should be carefully taught to our seafaring population. How the barometer may forewarn for a coming storm has been well pointed out by Admiral Fitzroy:—"Supposing that a storm is rising, and that a seaman wishes to know where the greatest strength of wind is. If he faces the wind in northern latitude, the centre of the circulation or cyclone will be square to his right; and, in the southern hemisphere, if he faces the wind, the centre will be square to his left; therefore he knows in which direction to go to avoid that part where the greatest strength is, and must shape his course according to circumstances. He can hardly have a simpler rule. His position with reference to distance from the centre, whether it is near the ship or far off, can be ascertained by watching the falling or rising of the barometer, and the way in which the wind shifts. It requires only a sketch upon paper—a rough figure, with an hour or two's observation of the veering of the wind, to know exactly in which direction to steer."

To this we will add a conjecture as to the reason for the barometer being an indicator of storms. Suppose a storm to be represented by a cylinder of air turning on its axis, and advancing (like a wheel) at the same time. The base in contact with the land or sea encounters friction and obstructions, especially from hills, trees, and buildings, &c. From such causes, the motion of the base of the cylinder will be retarded, and, consequently, the upper portion will lean forward. The storm, therefore, may begin at a considerable elevation above a place be-

fore the lower part has actually reached the place. This view obtains some support from the fact that the fall of a barometer during the first part of a storm is usually more gradual than the rise of the mercury during the latter part. If the axis were perpendicular to the place of the storm's centre on the surface of the earth, the barometer would there stand lowest. The leaning forward may produce the lowest barometer before the surface centre arrives at the place. From these considerations it may be easily conceived how the barometer may be affected some time before the storm has reached it, and thus afford a warning to those who are acquainted with its use and can appreciate its indications. The barometer is not only an indicator of the coming, but of the progress of storms also. Their approach is usually marked by a fall of the barometer. If the centre of the storm does not pass over the place, the barometer will fall until the part of the storm nearest the centre passes the place, after which it will rise. Dové is of opinion that, in those storms originating in the encounter of polar and equatorial aerial currents, the depression of the barometer is accompanied by a considerable change of temperature also.

The great storms which strike our shore have been considered by some scientific men as meteors having origin in the torrid zone, travelling westerly towards the tropic, there re-curling, and thence advancing north-easterly towards the polar regions, where they are supposed to die out. They are more generally believed to be the result of the encounter of polar with equatorial winds, to be confined to a comparatively small portion of the earth's surface, and to be limited in duration to a few days. Supposing the air over a considerable extent of the earth's surface to become much reduced in weight by copious precipitation of aqueous vapour, and heated by the latent heat given out by the vapour in its condensation, then the normal currents of the temperature zone would tend to restore the reduced pressure. But, in consequence of the rate of rotation of the parallels of latitude being slower the nearer they are to the earth's pole, the polar current has a westward tendency, and the equatorial an eastward tendency. In this way they act as a mechanical couple upon the area of low pressure, and produce a whirlwind which must have an invariable direction of rotation. Meteorologists assert that the northern portion of each whirl maintains the distinguishing features of a polar wind—namely, heavy, cold, and dry air, but this has never been shown to be the case for a number of consecutive whirls, nor has it been satisfactorily explained. The cyclone once formed, the area of low pressure must rapidly be filling up, and the passage of the polar wind to the south, and the equatorial to the northward, must soon restore equilibrium of pressure, temperature, and humidity, and the poleward and equatorward portions of the whirl, at each rotation, must exhibit less and less difference of these characteristics. Although the whirlwind character of every tempest which strikes our shores is borne out by the official daily observations, yet prejudice and misapprehension still prevail, for many self-opinionated seamen may be met with who deride or deny the laws of tempests, and who reckon as nothing the experience of hundreds of navigators, which affirms they have undoubtedly been the means of preserving many a ship from disaster.—*Mechanics' Magazine*.

THE SMITH O'BRIEN STATUE.

IN answer to numerous inquiries respecting this statue, and the prospect of its soon being placed on the site selected, we have to announce that the pedestal (which is to be of Dalkey granite) has been ordered, and is in hands. The figure (in Sicilian marble) has been long since executed by our fellow-citizens, Messrs. Farrell, and will soon be removed from their studio in Lower Gloucester-street, to the position now occupied by the lamps and pillars at south side of Carlisle Bridge.

RECENT WORKS IN DERRY AND VICINITY.

THE following, erected from designs by, and under the superintendence of Mr. John G. Ferguson, are among the most noticeable improvements (not previously noticed in the IRISH BUILDER) carried out in this city and neighbourhood during the past and present seasons.

A handsome and commodious residence for Arthur L. Cary, Esq., J.P., at Castle Cary, the old family residence, overlooking Lough Foyle. Mr. James Gallagher, Moville, contractor.

Manse and offices for the Presbyterian congregation of Glendermott, which adjoins the city. The manse is a neat villa in the Italian style, finished in a superior manner. Mr. D. Doherty, contractor.

The City of Derry Boating Club have recently erected a club house, which is very generally admired. In winter the boats have ample room for trim storage on the ground story, and there is a commodious club-room over. A gymnasium occupies the rear; lavatories, &c., are provided. The principal feature in the elevation is a lofty and well-proportioned campanile on the S.E. angle, which is surmounted with gilt cresting and a lofty weather vane; there is also a handsome balcony in front. Mr. Alex. McElwee, contractor.

The mansion recently built for William Tillie, Esq., J.P., at Duncregan, just within the borough, is perhaps the most important domestic erection in the district. It stands on a charming site, overlooking a noble bend of the historic Foyle; the ancient city lies immediately in front, and the lofty chain of the Ennishowen hills forms the background. The mansion has three fronts. There are an open porch of massive proportions, projecting windows, and two enriched bays carried the whole height, and surmounted with cresting, one each in the dining-room and drawing-room fronts. On the river front there is a handsome iron verandah. Internally there are vestibule and hall, with Corinthian columns, massive oak staircase lighted from ornamental dome, spacious reception-rooms, &c. The style is Italian. There is a commodious office range removed from the house, and a handsome gate entrance and porter's lodge. The grounds have been laid out with exquisite taste, under the proprietor's immediate supervision. Mr. Alex. McElwee, contractor.

Extensive additions have just been made to the previously large shirt factory of the Messrs. Tillie and Henderson, situate nearly parallel to the approach to the new iron bridge. The original factory was built about twelve years ago, and this, making the third enlargement, gives accommodation for over 1,000 workers on the premises. There are five floors, all occupied by the various departments. The recent addition gives a massive and most effectively broken elevation to the old factory, measuring 161 ft. in front by 40 ft. in depth, and 60 ft. high to the main cornice. The new building is flanked by square massive projections—assuming the form of towers—with steep truncated roofs, having the flats enclosed with ornamental balustrading. In these roofs are the airy and well-lighted schoolrooms. The well-arranged offices occupy the angle next Foyle-road. Every means has been taken by the proprietors to ensure the health and comfort of their *employés*. There are cloak-rooms, lavatories, &c. The light is abundant, and the ventilation complete. The new front is of pressed bricks, with deeply recessed and moulded jambs, and cut-stone quoins, strings, cornices, and keystones. Mr. Alex. McElwee, contractor.

Neat residence in course of erection for Mr. John Adams, Sion Mills, near Strabane. Mr. John Ferguson, contractor.

Manse, just finished, for Presbyterian congregation of Greenbank, Derry. Mr. D. Gamble, contractor.

Reconstruction—at present in progress—of the commodious grain markets at Moville,

erected at the cost of the Montgomery family. Mr. James Gallagher, contractor.

Three first-class villas, with offices, just being completed, for James McNeil, Esq., at Edenbank, on the Magee College Road. The fronts are pleasing Italian elevations, in which deeply recessed and effective doorways, with crested bays, rising two storeys, are the most prominent features. The buildings recede a considerable distance from the road, and the space is tastefully enclosed. Mr. Alexander McElwee, contractor.

Additions at Bellarena, the seat of Sir F. W. Heygate, Bart., M.P., comprising a large oriel window of cut stone rising two stages, alteration and extension of billiard-room, chambers, office range, &c. Mr. G. Given, Newtownlinavady, contractor.

New church at Burt, Derry, near completion. The edifice is in the Early English style, and consists of nave, chancel, robing-room, and tower and spire, with pointed porch annexed rising at N. W. angle. The apices of gables and spire are surmounted with gilt finials. The side lights are cusped lancets, filled with cathedral glass. The west gable is pierced by a large triplet. In the chancel is a traceried three-light window, which is being filled with painted glass by Forrest, of Liverpool, at the cost of the promoter, J. G. Bowen, Esq. The roof and benches are open, the woodwork stained and varnished, and the porch, aisles, and chancel laid with Maw's encaustic tiles. Mr. Alexander McElwee, contractor.

Addition to Burt House, just completed, for J. G. Bowen, Esq., comprising new vestibule and entrance-hall, drawing-room, with bay, and chambers over. Same contractor.

Boundary enclosures, Culmore church, Derry; buttressed piers, gate with lamps, railed embrasures, &c. Messrs. G. and R. Ferguson, contractors.

Primitive Wesleyan chapel just opened in Hawkins'-street. The chapel accommodates 160 worshippers. The west flank is pierced with cusped twin lancets, filled with cathedral glass, and has a neat porch at the south angle. A handsome school-house abuts on the east flank. The gable towards Hawkins'-street forms the principal elevation. It has coupled two-light windows, with pillared mullions and traceried heads, quatrefoil gable light, and airy bell-cot, surmounted with gilt cresting and finial at height of 50 ft. The roof and benches are open, and the woodwork stained and varnished; the fittings neat, and the porch and aisles inlaid with encaustic tiles. The walling is of rubble; the dressings of Glasgow stone. Mr. Robert Maxwell, contractor.

The "Carlisle Teahouse," for Mr. Robert Johnston, at Ferryquay-gate, just commenced. The site is at the junction of four leading streets, and is consequently well suited for effect. The building abuts upon the gate, and the front will be nearly curvilinear. Pressed bricks, with moulded dressings, will be used in the construction, and the windows will be filled with plate glass. Messrs. G. and R. Ferguson, contractors.

HOW TO BUILD.

WE read that the builders of ancient Rome were obliged to warrant their private buildings for ten years, and their public ones for fifteen. Moreover, every accident arising from bad construction during these periods *was to be made good by them or their heirs*. If they were unable to make the necessary repairs, they were whipped, shamed, and banished. Some such law as this, if it could be enforced in the nineteenth century, within the bills of mortality of this great city of London, would work a salutary and lasting reform. It is not "how to build," but how not to build; consequently structures are very often, in fact are daily, being erected, whose best recommendation is that they are certain to kill off some portion of every family which may have the misfortune to live in them. In the first stage of their existence, they effect this by dampness, want of ventilation, and the absence of any proper system

of drainage. In the second stage of existence of these houses, they kill off their inmates by the presence of too much ventilation. Doors, windows, and roofs exhibit the effects of employing green or unseasoned timber; aching pains begin to trouble the joints and shoulders; and, like the human body, the framing body of joinery creaks with a chronic asthma. In the house where there was insufficient ventilation at first, there is any quantity of wind and weather now, for tenon and mortise part company, and paper, lath, and plaster, follow suit, with a groan for the internal genii. The third stage in the life of those model structures is this,—that they suddenly drop to the earth with an epileptic spasm, without the least external warning; and in annihilating themselves they bury several families in the one general crash. Need we add the sequel? Scarcely. We will simply note an "inquest,"—verdict, "accidental death." Not a word of censure on the "jerry builder" or sham contractor, who made a nice thing out of speculating in the blood of his fellow-beings. Not a word of reproof on the man that "did not want any of your confounded architects." Not one word on the jack-of-all-trades who was surveyor, engineer, architect and all. No, not a word. He, like other "lucky dogs," caught up the "tip" of the day, and his trade is to build to *sell*, and not to build to last. Oh, would that the old Roman law were still in force, or that a vigilance committee were embodied so that the building ghouls of London could be "whipped, shamed, and banished from the country."—*Builder*.

MEMORIAL TO THE LATE REV. DR. TODD.

ON Wednesday afternoon about thirty of the friends and admirers of the late Rev. James Henthorn Todd, F.T.C.D., assembled at the Molesworth Hall, Molesworth-street, for the purpose of consulting as to the most suitable form of memorial by which his memory may be perpetuated. From the report which we give below, it will be seen that great diversity of opinion has been expressed on the subject. We certainly would be in favour of Mr. Gilbert's proposal, viz., the founding of a professorship of the Celtic languages in connection with the Royal Irish Academy. If it can be clearly shown that this project is feasible, it will be certain of meeting a hearty response from all classes of the community.

The Very Rev. the Dean of Ferns in opening the proceedings, said he had been called upon rather unexpectedly to preside, and not being fully aware as to the details of the various projects that had already been suggested whereby to perpetuate the memory of the late Dr. Todd, he was not in a position to give a *resumé* of them. He was not, for that reason, possibly prejudiced in favour of any scheme, but was prepared to hear all of them discussed. They were all well aware of the object of the meeting—to "resolve as to what form the proposed testimonial should take." He would not refer to how well he anticipated the movement would subsequently be taken up by the public—of all denominations—when set before them. By all denominations he said because Dr. Todd's name did not come before the public as one of interest merely in the University of Dublin. There was no name, he was sure, so well known, or more eminently appreciated in Ireland, for he (Dr. Todd) had connected himself with every department of literature. His name would be handed down and received by all parties in Ireland as that of him who had been the most impartial historian of their patron saint. The course he now suggested was this:—Three resolutions had been submitted at a former and private meeting, and these would now be read by the secretary, after which he would invite any gentleman present to address himself to the subject opened by them. He might add that there were other proposals before him, which would also be read in due order.

The secretary (Mr. H. B. Dobbin) then read the following resolutions, brought before a former meeting:—1. That the memorial take the form of one or more exhibitions, tenable by pupils of St. Columba's College during residence in the University of Dublin. 2. That, in the opinion of this meeting, the most suitable memorial to the late Rev. Dr. Todd would be the erection, on ground adjacent to St. Patrick's Cathedral (and at present at the disposal of the Dean and Chapter), of a hall, to serve as a place of meeting of the representative assemblies of

the Irish Church, and as a school-house for the boys of the choir, a project which Dr. Todd in his lifetime had much at heart. 3. That the eminent services of the late Dr. Todd are well worthy of being commemorated by the erection of a national monument to his memory, either in the form of a sepulchral monument or statue, or a bust in connexion with the sepulchral monument; and that the people of Ireland of all creeds be called on to contribute towards the accomplishment of that object."

Subsequently the secretary submitted a letter from Mr. J. T. Gilbert, R.I.A., suggesting that the most appropriate and permanent memorial to the memory of Dr. Todd would be the foundation of a Professorship of the Irish language in the Royal Irish Academy.

The Rev. Robert Rice said that, through having introduced the first of the three resolutions, he had obtained more public notoriety than he desired. His sole reason for bringing the matter before the previous meeting was to set the movement afoot. There was, up to that time, no other tangible proposal before them, and it appeared to him that linking together two such institutions as St. Columba's College and the Dublin University by the holding of exhibitions, would be a most fitting manner in which to perpetuate the memory of Dr. Todd.

Mr. Henry Colles supported the proposal of the Rev. Mr. Rice. There was no higher claim which Dr. Todd had ever put forward to their affection and esteem than his simple-minded, true, and hearty love for Ireland. He devoted to it his energy and learning, together with much of his means. His labours were to be traced in almost everything Irish—its language and its literature; and in recognition of such services there should be erected, in his opinion, a national monument. It was quite true that Dr. Todd differed from many of them on some subject or another; but still, as he had already observed, no man ever loved his country with a more devoted or zealous affection. By the creation of such exhibitions as had been suggested, they would at once recognise his connection with the Church, the University, education, and Ireland; and let him add this, that notwithstanding many reverses in future, the College of St. Columba was on a sure and apparently sound footing.

The Very Rev. Dean West said the second resolution had been drawn up at his instance, but under circumstances which he would wish to refer to. A number of the late Dr. Todd's friends assembled at the Palace, and in a meeting of that description, eager to combine the primary object they had in view with a benefit to the Church, he ventured to suggest and afterwards to propose that on the ground adjacent to St. Patrick's Cathedral there should be erected a hall to serve as a place of meeting for the representative assemblies of the Irish Church and as a school-house for the boys of the choir. He then remarked that, though the ground was now at the disposal of the Dean and Chapter, it would be taken from them after '71, whereas by the adopting of such a scheme as he proposed, it could be retained. As to the hall, he might state that that was not his primary object, but the school—a project which Dr. Todd had thought of for many years. However, at the meeting to which he referred it was considered that the memorial should be a national one, and accordingly he could not hope to press his suggestion. He begged to withdraw the resolution moved by him on the previous day.

Dr. R. R. Madden said he had already stated his views of the object they were called on to consider, namely, how they could best do honour to the memory of an eminent man who had rendered signal services to his countrymen in general, by the promotion especially of Irish historical pursuits and archaeological studies. That he considered was best to be effected by calling on Irishmen of all creeds to come forward and subscribe with a view to the erection of a national monument that would at once do honour to the memory of Dr. Todd and be serviceable to the living, by showing that departed worth and useful labours for the common good had been appreciated, and how their claims were recognised long after the tomb had closed over the remains of the performer of such services. The tombs of great and good men, be thought, might and ought to be thus made to convey instruction to the living, by placing before them enduring memories and examples of the honour and esteem in which the memory of the illustrious literary dead was held by all who loved literature and its pursuits for their own sake, and duly appreciated their influences on mankind. By such memorials, it seemed to him, encouragement might be given to the pleasing hope of being still well remembered after death, by making them—the memorials of the honoured dead—monitors of the living, who had trodden and who were treading in their footsteps,—memorials which were calculated to cheer the labours of the young, the struggling, and perhaps the unpatronized and neglected student of Irish history and archaeology. He thought by such means not only the illustrious dead might be honored, but living genius might be benefited, and its sons taught to deserve well of their country. He did not think that the memory of a man like Dr. Todd was

to be fitly honoured by promoting the views or interests of a section of his countrymen by building an assembly-room for Protestant ecclesiastical meetings. In regard to the proposals for foundations of Professorships of Irish Archaeology, and cognate historical pursuits, with a view to the main object of the meeting, they had to consider what was practicable, what had been already attempted in that direction, and what had been the results of such attempts, and of some others of a different kind, to accomplish archaeological objects of great pith and moment. In the year 1790, one of the most eminent men of his age, Henry Flood, bequeathed a considerable landed property to his wife, Lady Frances Flood, during her life, and, after her death, to the "University of Dublin, commonly called Trinity College, to hold in fee and for ever, for the purposes thereafter mentioned," "to maintain, as a perpetual establishment, a professorship of and for the native Irish and Erse language, and that they do appoint, if he shall be then living, Colonel Charles Vallancey to be the first professor thereof, with a salary of not less than £300 a-year." Then followed other objects to be carried out in conjunction with the said Irish Archaeological Professorship, such as purchasing Irish manuscripts and historical books of a like character. What with the law, what with the unfortunate prevailing unbelief of the time in the utility of any such object as that contemplated by Henry Flood, for all practical purposes, the bequest might as well have been made to the Emperor of China to carry out some analogous design of Confucius. Any similar application of funds, and especially of funds very limited in extent, for the same purpose as that of Henry Flood, to found a professorship, not in a University, but in an institution such as the Royal Irish Academy, must necessarily fail. In the first place the Academy had none of the attributes which signally characterized the mission of a University; it was not a teaching institution; and, again, any amount that could possibly be applicable from funds subscribed for such a purpose as that of the Todd Memorial would be wholly inadequate to the "foundation of a Professorship of the Irish Language in the Royal Irish Academy," with the especial view to obtaining "that which has been so long wanted—a reliable standard and scientific authority on the Irish language." For all these and many other reasons he objected to the proposition of Mr. Gilbert, and would urge his own resolution on the meeting.

The chairman said the next resolution for their consideration was that handed up by Mr. Gilbert, to the effect

"That it is desirable that the testimonial to the late Rev. Dr. Todd should be national in character, as well as calculated to perpetuate his own memory in Ireland and abroad, and, at the same time, to advance the branch of knowledge in which he was deeply engaged; it is, therefore, suggested that the testimonial shall consist of a Professorship or foundation in the Royal Irish Academy for the scientific illustration of the Celtic languages."

Mr. Gilbert said the want of such a Professorship as he referred to was generally acknowledged all over the world, and, in his opinion, the memorial, should it take this shape, would have the double benefit of laying a foundation for the reproduction of the early Irish literature, and perpetuating the memory of Dr. Todd in that especial branch of letters to which he applied most attention.

Sir William R. Wilde moved:—

"That the first application of a portion of the subscription raised for the 'Todd Memorial' shall be for the purchase of the 'Bell of St. Patrick,' provided that Dr. Todd's family are willing to dispose of it for a moderate sum; and that the relic be placed in the Museum of the Royal Irish Academy."

The proposition was seconded by Dr. Madden, jun.

Professor Jellett said what they wished to do was to perpetuate the memory of Dr. Todd, on account of his great services to very many different objects, but very specially to the case of the Celtic language and literature, and, as he took it, their only difficulty was to determine the most suitable method and the most suitable memorial which they could join in attempting to raise. Now, in order that a memorial should be suitable, it was quite plain that it must be in the first place something that would tend to perpetuate the name of the man to whom you are raising it; so that when, in any future time, any person look upon the building raised, or the institution founded, the name of the man whom they had honoured should at once rise up in a marked way. It must also be connected in an equally marked manner with the peculiar services which the man had rendered during his lifetime. They must endeavour to select the object of all others in which the greatest number of men and of people agreed, and take their stand there. Now, perhaps it was not too much to say that the most prominent point in Dr. Todd's character was that he was an Irishman, and attached to the literature and the antiquities of his country. He was, he (Professor Jellett) thought, better known as an Irishman,

and through his studies more peculiarly connected with Ireland than in other things. Then came simply the practical question—Was there a great object connected with Celtic literature, and with studies intimately connected with Ireland, which they would be able to promote? Certainly, in his opinion, the best of all such objects which had been suggested was the creation of a Professorship, not merely of the Irish, but of all the Celtic languages. If it were determined to attach the professorship to some institution, possibly the Royal Irish Academy approached more to nationality than any other. He had heard it urged against this that a sufficient sum to endow a chair—the salary of which must at least be £200 per annum—could never be raised by subscriptions towards a testimonial; but he thought it was at all events worth trying; and, even in the event of failure, they had the other projects to fall back upon, the best of which he thought was that of Mr. Madden.

The Very Rev. Dean Dickinson suggested that it should be left to the subscribers to say which of the two proposals—Mr. Gilbert's or Mr. Madden's—they preferred.

Dr. Stokes supported the proposition of Mr. Gilbert. The Hon. and Rev. W. C. Plunket trusted that the resolution of Mr. Gilbert would not be so framed as to have it appear of necessity that that was the only testimonial to be raised to the memory of Dr. Todd.

Mr. Gilbert read his resolution as amended, which was as follows:—

"That the testimonial to the late Rev. J. H. Todd be national, and shall take the form of a Professorship of the Celtic Languages, to be founded in connexion with the Royal Irish Academy."

Sir W. R. Wilde pressing his amendment, it was put, and declared lost, after which the resolution of Mr. Gilbert was adopted, the only dissident being Dr. Madden, who intimated to the chairman that, believing the matter was impracticable and illusory, he withdrew from the movement, and resigned his office of honorary secretary.

A committee was appointed to carry out the project of the resolution.

FINE ARTS.

Mr. Shakespeare Wood, of Rome, (the sculptor of the excellent bust of Mr. Tebbetts in the last Academy Exhibition), has published a lecture on the Vatican Museum of Sculpture, delivered before the British Archaeological Society of Rome, previous to his hearers visiting the museum by torchlight. The lecture contains much sound criticism and a useful summary of the principal known facts relating to the masterpieces of antique sculpture in the great Vatican collections. Incidentally, also, Mr. Wood makes some very sensible remarks on certain practices in England which cause the failure of many of our public statues. "Our Journals," says the author, "cry out that the public statues in the streets of London are a disgrace to the country, and doubtless, with one or two exceptions, they are so." He is fully convinced, however, that "the fault does not lie at the door of the sculptors, nor is it in any way due to the dearth of talent among them. The fault lies with the public itself. The historic statues of Greece would have been as poor and worthless as those of London had not a very different course been pursued from what is the custom with us. We let our great men, even our very greatest, die before we think of honouring them by placing their statues in our public buildings; and it is then, in ninety-nine cases out of a hundred, too late to admit of the possibility of a statue being made that will either honour the dead or be a credit to the sculptor, whatever his talents may be. For instance, let us suppose a case, and a very common one. A great man dies. A statue is to be erected to him. It is to be executed, say, by the most distinguished sculptor of the day. No cast was taken from his head and face after death; there is no bust of him in existence, and the form of his figure lies buried with the dead. How difficult must it then be for the great sculptor (and how possible for the sculptor of little experience to whom such works are often intrusted) to accomplish a work that will either do credit to himself or be an honour to his subject? How can he possibly make from such a dearth of materials a statue that will in any way represent the character and individuality of the man, in

the same way in which we have the character and individuality of Demosthenes, of Posidippus, and of Menander, represented in the three statues in the Vatican Museum? The Greeks and Romans, on the contrary, erected statues to their great men while they were still among them. When anyone had deserved well of his country, his statue was erected in the market-place as the greatest honour that could be offered to him; and consequently the sculptor had the man himself to work from, and could thus do full justice to his subject, and produced an object worthy of admiration of future generations." Mr. Wood supposes the case of the advantage of a statue having been erected to Lord Napier in addition to the vote of thanks on his return from Magdala. The success of the admirable statue of Mr. Peabody, and of some other statues of living personages, and the equally conspicuous failure of several posthumous statues lately erected, fully bear out the truth and importance of the sculptor's complaint.—*Illustrated News*.

CORRESPONDENCE.

[It is to be distinctly understood that although we give place to letters of correspondents, we do not subscribe editorially to the opinions or statements set forth in same.]

COUNTY SURVEYORS' COMPETITIVE EXAMINATION.

TO THE EDITOR OF THE IRISH BUILDER.

SIR,—It is now some two years since I applied to Sir Thomas Larcom, the then Under Secretary for Ireland, for a nomination for one of my sons for the important post of county surveyor, when he then informed me that it would be no longer considered a political appointment, but, under a bill to be passed through Parliament, it would be thrown open to the public by competitive examinations. It appears by an advertisement in your paper this time has at length arrived. I beg to complain of the programme published, for the following reasons:—When asking my youngest son, aged 26, who had been educated at Cork College, and just finished his apprenticeship with a county surveyor, under whom he was engaged a good deal on railroad works, he replied to me, though he could pass the examination he would not afterwards be able to hold the appointment, if he attained it, without at least ten years' experience in the practice of his profession. My elder son, whose age is 39 years, is a duly qualified engineer of eleven years' practical experience, and whom I had induced to fill the post of assistant county surveyor, in order to get a more complete knowledge of his profession with a view of a better qualification for such a practical examination as that heretofore adopted by the Commissioners of Public Works. His reply to me was that he would not enter the list with schoolboys fresh from their X and Y studies, and who, according to the programme furnished, would get 100 marks in one department, whereas the total allowed to the candidate that should qualify for a knowledge of "county works, including architecture, roads, drainage, and river works," was only 140, and no marks at all allowed for practical experience, which may be evidenced by references or testimonials. Indeed, he added, that he knew of only one county surveyor in Ireland who could pass the first part of the programme without a system of grinding or cramming, for which there was not even sufficient time allowed. My own opinion is, the whole object of theoretical science is to apply it to practice, and when the latter is acquired it is very hard, indeed, to expect a candidate to go back to his schoolday acquirements. I believe the entire examination as to the duties of a county surveyor ought to be confined to a perfect knowledge under that of the head of D, the paragraph before quoted, with the valuation of land, which would be necessary in order to fix the price to be paid for quarries, &c., the opening of approaches thereto, also for all ground to be occupied by the site of new works, &c., this, including a

general knowledge of the remainder of the programme under head of part 2. I will give an instance of a work on a railway in the south of Ireland in which I was lately consulted in charge of a young gentleman fresh from college, flushed with a knowledge of algebra and the calculus. It consisted of an embankment constructed on a peat and alluvial substrata, which had been effected at a cost of several thousand pounds, and was constantly giving way, owing to the fact of its having been trunked with what the engineer called the best quarry rubbish. On my recommendation the company had the entire of same removed and replaced with the soil on the spot, and which was of no greater specific gravity than the material on which it rested. Consequently the work is now good, and will continue so. Another instance I will mention is that of a bridge designed by a county surveyor who was at one time a mathematical tutor, and hence enjoyed the sobriquet of "Old Square Root." The abutments were built on piles, the retaining walls on mud, and not piled, and no invert being provided the latter forced out of the former, and the designer being expostulated with several times by the contractor, was merely reminded that his duty was merely to carry out his "specification." The consequence was that the bridge gave way, and was replaced, at a cost of several hundred pounds to the county, by one constructed with metal girders, and I venture to predict that the latter will still be inefficient.

Surely it ought not to be necessary that a candidate for the office should qualify as to competency a certificate of his passing such a programme as that described by the "Canon-row Commissioners."—Yours, &c.,

A RETIRED C.E.

THE TODD TESTIMONIAL.

TO THE EDITOR OF THE IRISH BUILDER.

SIR,—It is proposed to erect a memorial to the late Rev. Dr. Todd, and a meeting has been held and subscriptions have been promised. As a distinguished divine, an eminent scholar and antiquary, and a patriotic Irishman, I think he well deserves that honour. His range of study, as well as his different official positions, brought him more in contact with men of other Christian persuasions than is usual with ordained Fellows of our University.

We are said to have become a statue-making, testimonial-giving nation, and that the thing has been overdone, by those whose want of generosity throws that sarcasm in the face of all appeals to their pockets. Without discussing that matter farther, I will only observe that, from long personal experience, I have found that those to whom I allude have been equally retentive of their money when the cause of the destitute widow and the helpless orphan has been presented to them. If the proposed subscription is to be a general one, the object must not be what is termed "sectarian." It has been proposed to endow a school reputedly of High Church principles, and which was in a great measure founded by Dr. Todd. To that the Roman Catholics and the majority of the Protestants of Ireland are not likely to lend much aid. It has been proposed to erect a building within the grounds of St. Patrick's Cathedral, "a hall to serve as a place of meeting for the representative assemblies of the Irish Church, and as a school-house for the boys of the choir—a project which Mr. Todd, in his lifetime, had much at heart." So that he must have evidently anticipated the disestablishment of the Irish Church for some time previously. To that proposition I do not think either his Roman Catholic admirers or those among the Protestant dissenting communities will respond very liberally. It has been proposed that a "national monument or statue to his memory, either in the form of a sepulchral monument, a statue, or a bust in connexion with the sepulchral monument," should be erected; "and that the people of Ireland, of all creeds, be called on to con-

tribute towards the accomplishment of that object." Pending the collection of the funds to carry out effectively this desirable object, I refrain from comment.

It has been proposed by my friend Mr. Gilbert to create and endow, as the fittest memorial to Dr. Todd, a Professorship of Irish in connexion with the Royal Irish Academy. If the funds can be procured, I agree to that proposition; and I do not accede to the objection I have heard stated that there are no men to be found in the present day suited to the office, or likely to educate themselves in Celtic philology sufficiently to fill it hereafter. The Board of Trinity College will, no doubt, soon place Dr. Todd's bust with those of other Irish worthies in the noble library of which he was so long and so efficiently the eustodian. The Chapter of St. Patrick's will, or at least they ought, make some memorial in glass or marble of the man they did not make Dean; and the Royal Irish Academy will, I presume, decorate its hall with one of its most distinguished and oldest officers. And if others think St. Columba's College should be endowed with an exhibition, they can subscribe specially for that particular purpose. All these objects will probably have their supporters, and will be discussed at leisure; but there is one of more pressing, direct, and national interest, to which I now wish to call particular attention, and which indeed is the sole design of this communication. The late doctor was especially an Irish archaeologist and antiquary; in that department he laboured for the greater portion of his life, and chiefly on that account he was elected President of the Royal Irish Academy. Some years ago he purchased from the McClean family, near Belfast, the antique bell and beautifully decorated shrine called by some the "Bell of Armagh," but more generally known as "St. Patrick's Bell." The case is one of the finest specimens of ancient decorated metal work in Western Europe, and was in 1850 elaborately illustrated by chromo-lithographic drawings by the Messrs. Marcus Ward and Company. I and others fondly hoped that during his lifetime Dr. Todd would have presented or deposited this valuable relic of the art and piety of Ancient Ireland, or, in fulfilment of one of its original names "the bell of St. Patrick's Will," have bequeathed it to the great national collection in the institution that had so honoured him. Indeed, some were under the impression that he had purchased it (for, I understand, £150) in trust for the Academy, when that body should be in funds to repay him. In conversation with him on the subject of depositing the bell in our museum, he more than once said to me, "Oh! don't fear; it will not leave the country." Acting under this impression, I have been informed that the Committee of Antiquities of the Academy have communicated with the executors of Dr. Todd, stating the opinion that was entertained by some members of the Academy, and offering, under any circumstances, to repay them whatever sum Dr. Todd had paid for the bell. This, I understand, has been declined, and now it is possible that Ireland may have to contend with the British Museum, South Kensington, or any other home or foreign collection, or private collectors, for this national relic. I would, therefore, propose that the first use to be made of any subscription that may be collected in memory of the author of "The Life of St. Patrick" should be to purchase the bell associated with the name of our patron saint. I care little where it goes, provided it is secured for the country; and I think if this matter were settled that it would not lessen the amount of subscription for any monumental or other memorial now in contemplation. WM. R. WILDE.

The offices of Director of the Geological Survey of Ireland and of Professor of Geology in the Royal College of Science for Ireland, vacant by the decease of the late Professor Jukes, have been conferred on Mr. Edward Hull, M.A., F.R.S., by the Committee of Council on Education, upon the recommendation of Sir R. I. Murchison, Director-General of the Geological Surveys of the United Kingdom.

THE BOULEVARDS OF PARIS.

PARIS is famous for its parks, its squares, and its gardens, but its noblest features, and those most worthy of imitation in other cities, are its magnificent open streets, avenues, and roads, called boulevards. There are people who regard these as needless, simply created to serve the designs of an astute autocrat, and only possible under similar rule; whereas the fact is, they are merely such means of communication as would be found in every city of the world, if cities were designed with any due regard to their being fitting and healthy dwelling-places for hosts of men. Parks and gardens are excellent in their way, but they effect only a partial good if vast areas of densely-packed streets are unrelieved by green open spots where wholesome air may obtain a vantage ground in its ceaseless work of removing impurities. The slight good that is effected by fine parks here and there in or towards the outskirts of a city is as nothing compared with what may be carried out by so planning and planting streets and roads that the air in which the people work and sleep may day and night be comparatively pure and free, and the eye refreshed with green at almost every point. Paris exhibits the noblest and most praiseworthy attempts yet seen to render an originally close and dirty city healthy and pleasant for man; and this has been chiefly effected by her vast system of boulevards—wide well-made open streets and roads bordered with trees, and excellent footways as wide as many of the old streets, or wider. They do not simply pass through the city in one or several important lines, but pierce it in every direction, and are designed upon a far-seeing and systematic plan, so that during the future existence of the city overcrowding of its parts must become almost an impossibility. Many visitors who stroll along the fashionable and crowded boulevards of central Paris, who see them running in all directions from the Arc de Triomphe and offering bold approaches to every important position, may yet have but a meagre idea of their vast extent in the backward and less known regions of the city. The elm-bordered Boulevards Sébastopol and St. Michel cut through Paris from north to south, running miles in a straight line, and on their way effectually opening up the old Latin and many other close quarters; but beyond their outer extremities and between the fortifications and the central districts still larger boulevards sweep round, wide enough to be planted with groves of trees and to permit the breeze to play freely through no matter how high and thickly the buildings may be raised for years to come.—*Robinson's Parks, &c., of Paris.*

BOOKS RECEIVED.

The Architectural Publication Society send us the nineteenth part of their "*Dictionary of Architecture*," and also a part containing the illustrations to letters L and M. The Dictionary is now brought down to end of letter L; it is to be hoped that the society has been placed in such a position (peculiarly) as will enable them to proceed with the work, and bring it to a speedy termination.

"*The Journal of the Historical and Archaeological Association of Ireland.*" The quarterly part of this journal, just issued, contains, in addition to the report of proceedings, two valuable papers by J. O'Beirne Crowe, Esq. The first is entitled "The Faech Fjaba (Guardman's Cry) of St. Patric, with the ancient Preface. Printed from the original Irish in the Liber Hymnorum, a manuscript in the Library of Trinity College, Dublin; with an introduction, translation, and notes." The second paper is on the "Religious Beliefs of the Pagan Irish." A payment of 10s. per annum to this association entitles its members to a copy of its journal on publication.

NOTES OF WORKS.

Considerable repairs and restorations are being made to the Cathedral of Lismore, under the superintendence of Mr. E. H. Carson, architect. Mr. Anderson, of Fermoy, is the contractor.

Two large houses are in course of erection at Eden Park, Kingstown, for A. Collins, Esq. Mr. E. H. Carson, architect; Mr. Ryan, builder.

A new school-house and entrance lodge is being erected adjoining Dalkey Church. Mr. E. H. Carson, architect.

Extensive additions and alterations are about being made to the Pleasant Schools, Camden-street. The plans, &c., have been prepared by Mr. E. H. Carson, architect.

The new Roman Catholic church of Mary the Immaculate, Collon, county Louth, was dedicated on the 24th ult. by Cardinal Cullen.

LIVERPOOL.

Mr. G. F. Lyster, engineer of the Mersey Docks and Harbour Board, states in his annual report that the north wall extension and Government fort works remained at a standstill during the year. At the Canada dock the work of constructing a counter wall in front of the river wall, which had given serious indications of failure, has been proceeding satisfactorily for some months past. The Waterloo dock works, &c., have been completed. Various works in connection with the enlargement of the Morpeth dock have been completed. The masonry of the Morpeth branch dock has been finished. The total expenditure on dock works on both sides of the Mersey in 1868-9 was £239,012.

In connection with the new Liverpool tramways, it may be stated that the line from the Adelphi Hotel to the borough boundary is finished, and that the centre line running from the Adelphi Hotel down Lime-street and John's-lane, along Dale-street, Castle-street, Lord-street, and up Elliot-street back to the Adelphi Hotel, has also been finished. Ten of the carriages are now in Liverpool, and others will be placed on the lines as the traffic expands. Traffic is expected to be commenced in about a month.—*Engineer.*

MISCELLANEOUS.

In the town books of the Corporation of Youghal, among many other singular enactments of that body, are two which will now be regarded as curiosities. In the years 1680 and 1700, a cook and a barber were made freemen, on condition that they should severally dress the mayor's feasts, and shave the Corporation,—gratis.

THE DEATH OF A CENTENARIAN.—On Friday last a stone-mason, named William Heffernan, died at Johnstown, Co. Kilkenny, at the patriarchal age of 104 years. The deceased was never known to be in ill health until about 24 hours before his death. The chief mourners at his funeral were his great-grandchildren.

A WELSH RAILWAY ON A NEW PRINCIPLE.—The Portmadoc and Festiniog Railway is now attracting much attention amongst scientific men. This is a little line in North Wales, which was originally constructed for the purpose of acting as a tramway for slate and stone from the hills of Merionethshire to the seashore. It is now being used as a regular goods and passenger line. The chief peculiarity in its construction is that the gauge is only two feet broad. Hence, though the line runs through a very difficult country, the expenses of construction and working are so small that the traffic yields the enormous revenue of thirty per cent. The reason is simple enough. It is because the proportion between the dead weight and paying weight is so much less than upon other railways. The engine and tender upon this line weigh about ten tons, against forty tons upon the wider gauge of other lines. Instead of a first-class carriage weighing $7\frac{1}{2}$ tons, to carry thirty-two passengers, and representing nearly 5 cwt. of dead weight for each passenger the carriages on the Festiniog weigh only 30cwt. for twelve passengers, or $2\frac{1}{2}$ cwt. for each person carried. The *Railway News*, without going so far as to say that a two-foot gauge will furnish the railway of the future, is confident its economy and efficiency will cause it to be extensively adopted.—*Colliery Guardian.*

A WONDERFUL MEMORY.—Mr. Watts, of the National Library, possessed a most remarkable memory. He could instantly point out the press and shelf of probably more than 100,000 works. He liked to meet Americans, and always prided himself on knowing something of the personal history of every prominent one who came to see him. The writer well remembers two attempts to test this faculty. One day without any notice, he took a friend into Mr. Watts's recess, and said abruptly, "Mr. Watts, let me introduce to you Prof. Silliman, of Yale College." "Oh," said he, rising, and cordially extending his hand, "how very fortunate, Dr. Benjamin Silliman, that you should appear here of all places in the world, just fifty years since your first visit, when in your 'Travels' you wrote a most interesting account of our library. Come, let us go and see your rare little book, and at the same time I will show you the library, and afford you the opportunity of writing another account, showing our half-century's progress,"—and he walked off the professor to a remote part of the library, and laid his hand on the volume, as if it had been one for his daily reading. A similar readiness delighted and astonished the Hon. G. P. Marsh with respect to his little privately printed Icelandic grammar.—*Builder.*

A very handsome monument has just been erected by the officers of the regiment to the memory of the late Paymaster (Major) G. Pollard, in the officers' burying-place, in the beautiful graveyard of Ballysax Church, Curragh Camp. The tomb consists of a fine slab of fawn-colour marble, raised upon a basement of hewn granite.

A bronze statue has just been inaugurated in Rochelle to Admiral Duperré, one of the French seafarers of the past generation. At the base of the statue, the words—"Sink me, but I'll not lower the flag," are to be inscribed, at the suggestion of the Minister of Marine. This is the phrase attributed to Duperré in answer to a demand from the captain of an English frigate to surrender, at the combat of Groix, off the Breton coast, on the 8th March, 1808. It was further related of Duperré that, on two occasions, he had beaten British squadrons with his single ship—a recital which I respectfully relegate to the mariner. He conducted the naval part of the expedition to Algiers, for which he received his grade of Admiral, and a sword of honour from his native port. How the brave fellow, were he living, would have winced at the fulsome eulogies showered on him. The face on his statue might well have blushed if it were not a face of brass.

A competitive examination for two County Surveyors will be held during the present month. The salaries are £500 and £400 per annum. The particulars will be found in our advertising columns.

THE DOWNSHIRE MEMORIAL.—It has been decided that this memorial shall assume the form of houses for widows, orphans, and other destitute persons on the Downshire estates, to be erected in the neighbourhood of Hillsborough, Co. Down.

The liberal and impartial manner in which the Supplementary Exhibition of Pictures, held this season at 25, Old Bond-street London, was conducted has given great satisfaction to the general body of English artists, and the success of the exhibition has been proportionately great. The facts that about ninety-pictures were sold from the walls, and nearly ten thousand persons visited the Bond-street Galleries during the two months they were open, are regarded by the committee as fully justifying an attempt to repeat next year an exhibition so well calculated to benefit deserving and rising artists. Meanwhile, in order to still further utilize the rooms, the committee has resolved to hold in them a winter exhibition of oil paintings and water-colour drawings, to open early in November next; and all artists desirous of aiding the objects of the committee are invited to join the large number of their distinguished brethren who have already promised their support.

MODERN INVENTIONS.—That great invention the "Chronograph," which times all the principal events of the day, and has revolutionized and superseded the clumsy old-fashioned "Stop-watch," seems likely to be eclipsed in fame by that still greater and more useful invention the "Keyless Watch." The fact of no key being required renders these Watches indispensable to the traveller, the nervous, and invalids. The enormous number sent even by post to all parts of the world, is a convincing proof of their great utility. The prices at which they are sold range from 5 to 100 guineas. Thousands of them are manufactured by Mr. J. W. Benson, of Old Bond street, and of the Steam Factory, Ludgate-hill, London, who sends post free for 2d. a most interesting historical pamphlet upon watch making.

All Communications respecting the IRISH BUILDER, should be addressed to MR. PETER ROE, 42, Mabbot-street, to whom all payments for Subscriptions and Advertisements must be made.

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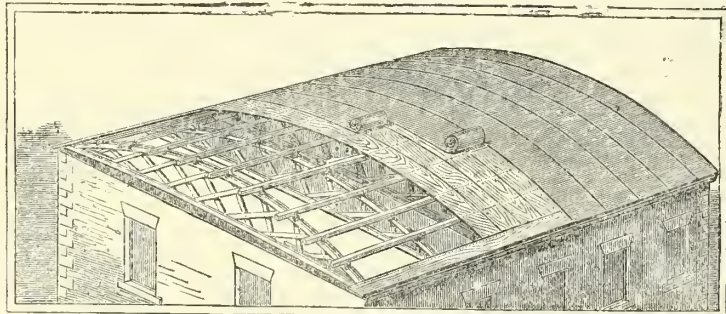
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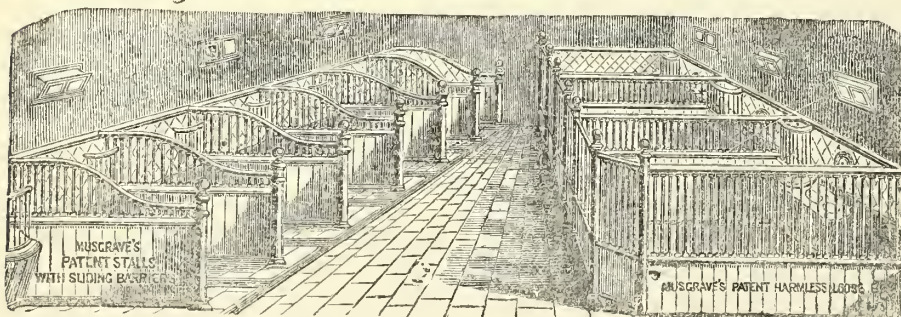
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LONDON ROMAN CEMENT,
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TESTIMONIALS.

From WILLIAM TITE, Esq., M.P. for Bath, and Architect of the Royal Exchange, London.

House of Commons, 2nd March, 1864.

DEAR SIR,—In reply to your note, I beg to say that I have used both the sorts of Cement manufactured by your firm, and that of Messrs. Francis and Son; I mean the Cement usually called Roman Cement, or the more recent introduction of Portland Cement. I believe these Cements, manufactured by either of your firms, to be equally good. I know no difference, chemically or practically, between them; and I should use, and authorize to be used indifferently, either one or the other. You are at liberty to use this note, if you think it necessary.—I am, Dear Sir, your obedient servant,
Messrs. White & Son. (Signed) WILLIAM TITE.

From R. O. MINNIE, Esq., Surveyor to Board of Ordnance, London.
War Office, Pall Mall, London, S.W.,
3rd March, 1864.

GENTLEMEN,—In reply to your request, I have much pleasure in stating my favourable opinion of the quality of your Portland and other Cements, which have been extensively used in the Public Works connected with the War Department at home and abroad, especially in several of the fortifications now being erected in this country. On all occasions within my knowledge the quality has been equal to that of any other manufacturer, and has given great satisfaction.—I am, gentlemen, your obedient servant,
(Signed) R. O. MINNIE, Surveyor.

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The Limestone can be had in full cargoes, also their Roman Cement, London Portland Cement, and Plaster of Paris in bags or barrels. Apply to the Works, or

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N.B.—A Circular and Price List will be sent post free on application

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Ornamental Quoins.	Flower Vases and Pedestals.
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Stable Pavin Bricks.	Milk Coolers.
	Pickling Dishes.
	Ground Fire-Clay, &c., &c.

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Field Drainage Pipes, from 1 1/2 inch to 6 inches in bore, of the best quality, at moderate terms.

Prices and all particulars on application. Inspection invited.

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MESSRS. EARLEY AND POWELLS beg to announce that Messrs. John Hardman and Co., of No. 1, Upper Camden-street, have resigned the business of Artists, Sculptors, Church Painters, and Metal Workers, in their favour.

Earley and Powells have added to the above mentioned business the Painting and Staining of Windows for ecclesiastical and domestic buildings, under the management of Mr. Henry Powell, who conducted the Stained Glass Department of J. H. and Co., Birmingham for many years.

Mr. Thomas Earley is the only Church Decorator living who was taught his profession by the late A. Welby Pugin.

E. and P. being thoroughly practical men in each Department, are enabled to supply real artistic work at a moderate cost. They, therefore, respectfully solicit the patronage of the Clergy and Gentry of Ireland.

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The Irish Builder.

VOL. XI.—No. 238.

The Foundation-Stone of the Parliament House.

BY reference to the map* of Dublin, 1610 (*vide* Malton's Views of Dublin), a large rectangular block of building will be seen and marked "Carye's Hospital," this, St. Augustine's Church, and the east court of Trinity College (which was then the entire of the original edifice) were the only buildings existing upon Hoggin, now College, Green. The Nunnery of St. Mary and the Priory of All Hallows stood at a former period upon the ground now occupied by Trinity College, but no traces of them appears upon the map above referred to. Sir James Ware gives some interesting particulars relative to the discovery of an ancient sepulchre upon this spot, and the name Hoggin appears to have been a corruption from the Teutonic word Hoga, denoting sepulchral mounds.

Somewhere about the year of grace one thousand five hundred and ninety a garden occupied the north side of Hoggin, now College, Green, the site upon which the Bank of Ireland now stands; upon this garden Sir Thomas Carye, Lord High Treasurer of Ireland, built a large handsome and substantial edifice intended to be an hospital, but that it was ever used as such we have no authority to show. The Government appear to have been anxious soon after its erection to purchase Carye's hospital, as it was then called, but declined on account of the sum demanded for it; however, it appears to have been temporarily occupied by them, for we find that at Michaelmas, 1605, and two succeeding terms, the courts of law were held there. Eventually it became the property of Sir Arthur Chichester, and acquired from him the name of Chichester House. It was afterwards occupied by Sir John Borlace, who, in 1634, was nominated Master General of Ordnance in Ireland, and in 1640 Lord Justice in conjunction with Sir W. Parsons. Here the Privy Council used to sit, and the first Parliament convened in Ireland after the Restoration sat within its walls upon the 8th of May, 1661.

Chichester House was permanently taken by the Crown for the Parliament of Ireland in the 25th year of the reign of Charles II., and was occupied for the sittings of the legislature until 1727, when, being found to be in dangerous condition, a report was made on the 10th January, 1728, that the erection of a new building was absolutely indispensable, and the House resolved that the site upon which Chichester House stood was the most convenient for the erection of a new Parliament House, and a lease of the ground for 900 years was taken by the Crown. Thomas Burg, Surveyor General, was directed to prepare plans for the intended building, but the name of Sir Edward Lovet Pierce, who succeeded Burg, appears in all official documents as the designer of the building; it was generally rumoured at the time that the plans were in reality by Richard Castle, the archi-

tect of Leinster House, and Pierce was further charged with defrauding Castle of the amount promised by him for his plans. Numerous curious particulars and anecdotes in connection with Chichester House may be found in Gilbert's History of Dublin, to which we refer those having a taste for antiquarian matters, and we acknowledge ourselves indebted to it, as well as to Malton's Views of Dublin, for much of the information we have above given.

In a scarce old volume, printed in 1730 by J. Watts, at the Lord Carteret's Head, in Dame-street, for J. Fennel, at the Three Blue Bonnets, in St. Patrick-street, we find the following description of laying the first stone:—

"Edward Lovet Pierce is the contriver and projector of that strong, well-contrived noble pile, the Parliament House, whose first stone was laid at the South side on February 3rd, 1728-9, by the Lords Justices, together with several of the nobility and members of Parliament, attended by the yeomen of the guard, a detachment of dragoons, and another of foot, in the body of which stone is laid two silver medals, with the effigies of their present majesties, King George and Queen Caroline, and over the medals was laid a plate of copper, on which is engraved the following inscription:—

SERENISSIMUS ET POTENTISSIMUS REX
GEORGIUS SECUNDUS,
PER EXCELLENTI DOMINUM
JOHANNEM DOMINUM CARTERET, BARON DE HAWNES,
LOCUMTENENTEM,
ET PER EXCELLENTI DOMINOS
HUGONEM ARCHIEP. ARMACHAN,
THOMAS WYNDAM CANCELL,
GULIELM CONNOLLY, DOM. COM. PROLOCUT,
JUSTICIARIOS GENERALES,
PRIMUM HUIUSQUE DOMUS PARLIAMENTI LAPIDEM POSUIT,
TERTIA DIE FEBRUARIA, ANNO DOM.
MDCCXXVIII.

And their Excellencies the Lords Justices were pleased to leave on the stone a purse with twenty-one guineas, which the aforesaid Captain Pierce, the architect, distributed among the craftsmen to drink towards the health of their Majesties, the Prince of Wales, and the rest of the Royal Family."

After the Union the Parliament House was purchased by the Bank of Ireland for £40,000, subject to the annual rent of £240, and it was adapted to their use from plans by the late Henry A. Baker, Master of the Architectural Classes in the Royal Dublin Society's Schools. The building is still in the possession of the Bank.

NEW CATHOLIC CEMETERY, BELFAST.

THE Town Council of Belfast having refused any concession to certain demands made by the Roman Catholic bishop, Dr. Dorrian, on the part of the Catholic inhabitants of the town in the matter of the Catholic portion of the new Borough Cemetery, his lordship has succeeded in purchasing an excellent plot of ground, some fifteen acres in extent, in the immediate vicinity of the Town Council's grounds.

It is not for us to discuss the action of the Belfast municipal body in refusing to grant to Dr. Dorrian what has been unhesitatingly given by the corporate bodies of Liverpool and Limerick to the respective Roman Catholic bishops. We can only admire the energy shown by the bishop in this undertaking. At a meeting of the Privy Council, held a few months ago, before which the Town Council and Dr. Dorrian both appeared, it was ordered that Friars' Bush Cemetery (the Catholic place of interment) should be closed on the 25th November.

The position then held by the bishop and those whom he represented was this, that they should either have themselves provided with a new cemetery of their own by the date mentioned, or should accept the allotted portion of the Borough Cemetery, and with

it the conditions imposed by the council. There was evidently no hesitation on the part of the bishop as to the course he should pursue, inasmuch as in the short time which has elapsed since his last appearance before the Privy Council he has purchased, at a cost of £4,100, the fifteen acres above alluded to; and more—the money has been paid, without any appeal to the Catholics of the town, the bishop and two gentlemen acting with him having advanced the required sum.

The ground will be ready for interments on the 25th, but of course a great deal remains to be done to render the work perfect; enclosing walls have to be built, handsome entrance gates and railings erected, and later on a mortuary chapel, &c. These will be from the designs and under the superintendence of Mr. T. Hevey, architect, of Belfast, to whom the bishop has entrusted this portion of the work.

The levelling of the ground and formation of roads are being executed under the direction of Mr. J. Smith, C.E., of Belfast.

BUILDING IN CONCRETE.

WE print in this number a letter from Col. Chichester, in which he expresses his entire satisfaction with the works which have been executed in concrete (Tall's system) at Runnamoat, under the superintendence of Mr. M'Owen. The writer states that he has effected a saving of 30 per cent. by using this material in preference to rubble masonry. It is very probable that at no distant period we shall visit Roscommon, and make a call at the colonel's residence, where we shall have an opportunity of judging for ourselves as to the merits of the concrete process, regarded both economically and practically.

THE FAILURE OF THE HOLBORN VIADUCT.

RESERVING till the proper time any final judgment with respect to the appearances on the surface of the Ross of Mull granite pillars, by which the iron bridge of the Holborn Viaduct, crossing Farringdon-street, is supported, we (*Daily Telegraph*) may note two consolatory facts, of which the public may be well assured—first, that the actual safety of the structure is in no way threatened; and next, that the evil, which is mainly one of appearance, can be remedied. It will be the duty, we apprehend, of Mr. Haywood to report the circumstances to the Corporation, and we shall then be in a fair position to comment on the facts of the case.

A doubt has, from the first, been entertained, and has, indeed, been a topic of debate among practical engineers, whether it was altogether judicious to entrust the support of such an enormous superstructure to granite columns "made up" like those at the Farringdon crossing, where the slightest "give" from settlements, contraction, or expansion, must be fatal. None of the polished surfaces of either the massive stones composing the columns, or the smaller ones composing the plinths, if injured in any way, could, it was urged, be used again, but would require to be replaced *in toto*. It may be conjectured, without prejudice to the report and advice of Mr. Haywood—an engineer and architect of whose competence to deal with crises of a far more formidable character there can be no sort of question—that the columns which have already begun to crack, chip, and splinter, will be replaced by others better fitted to endure the pressure placed upon them.

If, as we surmise, other columns must take the place of those which now carry the iron bridge over Farringdon-street, it will be worth considering whether the new supports may not be of a mixed character, equally elegant,

and at the same time more in accord with the composite construction of the viaduct itself. Whatever be the determination to which Mr. Haywood's report may impel the civic authorities, we have unimpeachable authority for saying that no stoppage of traffic is likely to be caused, and that no danger is to be apprehended.

On the same subject the *Daily News* says:—The actual damage to the structure has been greatly exaggerated. There are no such things as cracks "three-eighths of an inch" or "more than a quarter of an inch" wide; and in the ordinary significance of the words it is not possible to see through the interstices where the parts of the shaft have been joined. Even where the cracks appear the widest they hardly reach these measurements; and their apparent dimensions are greatly due to the picking away of the edges of the brittle granite by curious observers. What has occurred is sufficiently unfortunate and annoying, and it is a pity that its magnitude should have been enhanced by unintentional exaggeration. The most serious injuries have been sustained by the columns on the eastern side, and here the actual fractures are more noticeable in the base pieces than in the shafts. The columns, indeed, generally exhibit two kinds of injury—one splitting or cracking and the other something which looks like bruising or squeezing, and which seems in places to have given to the usually crystallized (we use the word in its most general sense) character of the stone an almost fibrous appearance. The abutment columns, as far as we could observe upon a careful examination, had, up to yesterday afternoon, sustained no injury, and none of them has had to be subjected to any operation to keep it together. The columns which exhibit the most evident marks of injury are the second and third of the eastern row, advancing from the south. The base pieces of both these—we are always speaking of that part of the column which is in red granite, the true bases of grey granite being, as far as we have ascertained, as perfect as when first erected—exhibit very decided cracks or splits, which, there seems every reason to believe, penetrate the whole width of the stone, and substantially divide it into two parts. Most of the columns on this side exhibit some traces of one or other species of injury to which we have already alluded; and in all cases the joints between the shafts and the base pieces have opened to an extent which, although we have heard it described as immaterial, is to the unprofessional eye, at all events, unsatisfactory. On the western side of the bridge the appearances of injury are much slighter than on the other; but even here traces of a similar action—whatever it may be—to that which has operated on the eastern columns are in many instances to be discovered. There are small cracks in both shafts and base pieces of several of the columns; but the most serious injury appears to be a large and conspicuous crack in the shaft of the second pillar from the south.

Should it be necessary to remove all the columns and substitute others for them—and that some must be taken out is extremely probable.—this task could even be performed without stopping the traffic over the bridge; and, therefore, as far as can at present be foreseen, there is no danger that the public should be deprived of the advantages which it has during the last few days derived from the opening of the Holborn Viaduct.

At present, as far as we are aware, three causes, and three only, have been suggested to account for the injuries which have appeared,—one, a defect in the foundations; another, a weakness or liability to fracture in the stone itself; and the third, an imperfect or faulty construction or arrangement of the joints of the three sections of the pillars, by means of which the several parts of each section have been subjected to unequal strains. The foundations are, it is true, in close proximity to that old enemy of improvement, the Fleet Ditch, which has more than once occasioned trouble to engineers; but they were carried down to what was supposed

to be a sufficient depth below its bed to obtain a sound resting-place, and, until much more complete and accurate information has been obtained, it would be premature to attribute to any default in this respect the defects which have made themselves apparent. The materials of which the columns are composed ought, according to the recognised calculations upon which engineers are in the habit of acting, to bear a much heavier strain than any which has yet been cast upon them; and the joints, so far as is at present known, were made in the usual manner, the two heavy blocks of stone being placed one upon the other with a sheet of lead between them. It is possible that the surface of the stones may not have been smoothed with sufficient accuracy to give a thoroughly level bearing, and that this may have been the cause of the mischief; but as yet there is no reason to adopt this rather than any of the other explanations suggested as the true solution of the mystery.

The *Engineer* of the 12th inst. contains a lengthy article on this subject, in which a means of remedying the defect is suggested: Some of the fractures are long and too serious to be viewed as mere eyesores; but if the cause of the evil be at once removed, the injury may be prevented from going further and the evil will be reparable without taking down the whole structure; if not so stopped, however, the fractures will rapidly extend and increase, and the columns at least will be destroyed. . . . And now what is to be done to prevent the entire destruction of these costly ranges of polished columns, and keep them safe hereafter? The remedy fortunately is not difficult, and need not be very costly; but to be of any use it must be prompt. The columns must be completely freed from all rigid connection with the superstructure, the pressure from which must be made to be vertical pressures alone, and these through the axes of the columns.

There is a sort of plinth about 12 in. deep above the capital of each column, which, if taken out, will luckily afford just room enough to put instead as many sets of supporting balls, or spherical knuckles, on which the superstructure shall rest and be free—being also freed upon its land abutments. If this be done promptly, the columns can yet be repaired and their disasters be forgotten.

Let heavy wale timbers then be at once shored up against the soffits of the lines of girders in line with Farringdon-street, at both sides the lines of columns, and, by enough screw jacks, let the columns be relieved of their loads—half an inch will do it. Support and raise also in like manner from beneath the centre of the large arched girder and so let all stand, until the new friction ball capitals for the columns shall be got ready and put into place, when all may be set right again—assuming the large arched girders to be strong enough to do without being *encastré*, and without stopping the traffic.

As to whom this delicate operation ought to be entrusted to it is not for us to offer any opinion, but we will venture bluntly to say that the aldermen and other City magnates will act wisely by at once putting such an operation as we have merely sketched into the hands of some competent engineer, accustomed to iron work rather than to brick and architecture, and postpone their intended "full discussion as to the causes of this disaster," for the present at least.

THE NEW ORGAN FOR ST. ANDREW'S, WESTLAND ROW.

WE are glad to perceive that the order for the new organ in above church has been entrusted to our fellow-citizen, Mr. White, Bishop-street. The other parties from whom estimates were had are—Messrs. Bryson, Messrs. Hill, and Messrs. Flight and Son, London. Mr. John Gunn, in his report to the committee, states that "Mr. White's estimate is for an organ with 2,008 pipes, the double diapason all metal; bellows with four feeders; the pedals, draw stops, &c., to be made of hard

wood, with the most recent mechanical improvements; the pipes and all other materials used to be of the very best quality; the case to be of stained pine, with speaking pipes in front, similar, I am informed, to that in St. Andoens, High-street. The price to be £1000, including cost of erection. Of Mr. White's capabilities, the committee is in a position to form a correct opinion. I have spoken to several organists who have had practical experience of instruments built by him, and they agree in saying that they are soundly and durably made, and satisfactory to play upon, and that his manufacture has shown a marked and progressive improvement within the last few years."

We cannot do better than transfer to our columns some portions of the statement laid before the parishioners at a meeting held in the Church of St. Andrew, Westland-row, yesterday. The Right Hon. the Lord Mayor in the chair:—

"In the course of little more than six months subscriptions to the amount of £648 have been received or promised. One of the earliest questions that occupied the attention of the committee had reference to the amount of money which it would be requisite to expend in the purchase and erection of an instrument worthy of its purposes, of the church, and of the parishioners. Inquiries were instituted in various quarters, and the conclusion arrived at was that a sum of not less than £1,000 would be needed. Having determined on such an outlay, the next question that offered itself for deliberation was as to the builder, to whom the construction of the organ should be entrusted. The committee, though one and all animated by the strongest desire to advance the interests of Irish art-manufacture, were fully aware of the difficulties that surrounded the question, and of the delicate and embarrassing position in which they were placed. They were of opinion that, whatever their individual inclination might be, their strict duty demanded of them that they would suggest a course which would end in procuring the best possible value for the money that was given them to spend. They were resolved to exclude all notions of preference, and that, in honourable competition for the prize of selection, even the strong claims of native manufacture should be disregarded except in as far as this natural limitation went, viz., that in case of equality of merit, native art should have their first regard. In the meantime the committee were not idle. The secretaries were directed to write to eminent organ-builders in this country and in England. When the estimates were received the committee were largely aided by two of their brother members, with whose experience in matters of this sort they and the public at large were fully conversant, and in whose high honour, strict impartiality, and genuine patriotism they had the most unbounded reliance. The committee need scarcely say they allude to the Messrs. John and Michael Gunn, of the eminent musical firm of M. Gunn and Son, Grafton-street."

The subscription list was headed by the name of Mr. Michael Meade, builder, Great Brunswick-street, with the sum of £50.

A correspondent of the *Athenæum*, writing from Washington, says:—In the way of scientific novelties I send you the following. A loom is now on exhibition in New York, which is capable of weaving cloth 6½ yards in width; also, a centrifugal pump, which has the power of raising, in one minute, not less than 25 000 gallons of water. From the granite quarries of Monson, in Massachusetts, there was recently taken a slab, 350 feet in length, 11 feet wide and 4 ft. thick, measuring altogether 15,400 cubic feet, and weighing 1,283½ tons. In this connexion, I may add that there has just been organized in New York what is called a "Liberal Club," the object of which is to disseminate the knowledge which the progress of scientific research is daily adding to the information of the race, particularly in the branches of literature, positive science and social economy. At its first regular meeting, an essay was read, by Dr. Adolph Ott, on the "Book Trade and Literature of Rome during the First Century."

FINE ART IN A FARTHING.*

THERE is hardly to be found in the history of Art anything more interesting and instructive than the efforts made, in the very rudest times, to impress some beauty or information on the pieces of metal which formed the medium of exchange. Very often the only record of a distant time and place is to be found in the battered coin which has been dug up out of the waste of rubbish and dust of buildings which is all that remains of vast and populous cities—nay, of empires. Thus we have not only preserved to us the costume of the age in which the coin was struck, and the alphabet at least of its language, but some semblance of the forms and faces of those who ruled over the countries of which these fragments of metal are the sole records. Every phase of art and style of workmanship is to be found in coins, from the very rudest of archaic Greek and Anglo-Saxon to the most delicate workmanship of the Greek and Renaissance. In the very rudest of the Saxon and Norman coins of Alfred the Great and of William the Conqueror, as in the rude silver pennies, effort seems to have been made to give at least some idea of the character of the faces of the persons to be represented, of the costume worn by them and the insignia of their rank, but also by the cross on the reverse of the coin a clear and unmistakable sign of the national faith. The very lettering is also indicative of the date of the coin, and consequently of the reign of the king. Coins are therefore of no small interest, and as works of fine art and specimens of the sculptor's art, are of rare and peculiar value; and it will hardly be denied that the government of a state can do no more instructive work than the putting into circulation, and into the hands of the general public, a fine and nobly-designed and executed coinage.

But it is to be recollected that all these specimens of noble coinage come from times of scientific ignorance, and in the total absence of "art-principles," that the object of those who designed and executed the dies from which the coins were struck seems simply to have been to represent, as well as could be, things as they then were; but in these more fortunate and scientifically advanced days all this is reversed. If the scientific reader will now take out of his pocket and attentively examine a common penny piece, or a halfpenny, or even a farthing, he will see that all this old-fashioned realism is treated with a very proper amount of contempt and disdain. A penny piece is not a common work of art, but a highly imaginative work of fine art; it deals with things altogether remote from common and everyday occurrences and palpable facts; it would indeed seem to be exactly typical of John Bull's notions of romance and playful fiction. On the one side is Britannia balanced uncomfortably on the sharp edge of an oval shield, with a very small lighthouse about the length of her foot on one side, and a small ship on the other to match it. It is impossible to conceive anything to be worse executed than this flat figure; it simply shows the art of die-cutting at its very worst and lowest. How many people there are within the British dominions who have the slightest notion as to *who* Britannia was, or is, may be a question for the curious and the Master of the Mint, or what special significance the said Britannia can have on a penny piece. Perhaps there may be some explanation of it in the inscription so badly engraved round her "one penny;" looking, as it does, like her name! Be it observed in passing that this dull work is not clerks' work, or the doings of the assistants at the Mint. It is utter incapacity at head-quarters set to work on a blank piece of copper. But if poor Britannia on the reverse of this worthless modern specimen of the art of coining be a thing to wonder at, what shall be said of the *heul* on the obverse of this coin, which looks so like the small head of Britannia drawn to a larger scale? Who does it represent? Not

Queen Victoria certainly, though the name is written on it. Is it Minerva or Wisdom, or some recollection of that ubiquitous head which is to be seen everywhere whenever and wherever a "bust" is required? It is very much to be doubted whether, among all the nations of the earth which have had a coinage, it ever came to pass that the likeness of the ruling sovereign was purposely misrepresented, or rather not represented at all. However rude the workmanship and imperfect the art, the effort was at least made to express the likeness of the monarch to be represented. In the more perfect art, as is so well known, the likeness is admirable, and we have an exact and veritable portrait of the reigning king or queen, and a faithful record of the age in which the coin was struck. The capitally-cut portraits of Queen Elizabeth on the coins of her time, may be cited in proof. In some of the Greek coins the art is as perfect and as noble as the Greek sculpture, and each coin is a gem. That we are progressing is quite certain, though towards what may be a question; but one thing is equally certain—it is not towards a good penny piece or even a farthing; and equally sure is it that silver shillings and sixpences are no better than coppers.

But, perhaps, we may here be allowed to ask *why* this should be? Why should not we have the express likeness and true portraiture of Queen Victoria on the common coinage of the realm; and what is it that stands in the way of it, if anything does; and why, at the same time, we should not do away with Britannia altogether, and substitute for her some more intelligible and slightly and expressive emblem on the current coinage? We have lately seen a photograph of her Majesty Queen Victoria in a riding dress, with hood, in *profile*, very admirably taken, which would seem to be in idea all that can be desired as portraiture for a coin. It needs only good modelling and skilful die-cutting to make a work of fine art one thoroughly expressive and appropriate. There should be nothing but the name of the sovereign by the side of the head on this side of the coin, so as not to interfere with, or mar in any way, the effect of the head, which should nearly fill the circle. On the reverse, "Britannia," being gone, it would seem to be worth suggesting a return to the old idea, as seen in the earlier coins, of the emblematic *cross*, expressing as it did, and would do, the accepted faith of the age and country. This, with the date and the words, "Queen of Great Britain and Ireland," in English and not Latin, would fill the reverse of the new coin. Heraldry has well nigh come to its end, and has ceased in the general public mind to have any intelligible significance, so that we may well leave it out; and what is more, if it had any, it seems impossible to draw, much less engrave, an heraldic animal or emblem of any kind.

Thus would there seem to be a something in the future, in the way of coinage, more interesting and practical, and certainly less dangerous, than the proposition of Mr. Lowe to clip the coinage, for of course this proposed improvement in the *art* of it would include the gold and silver coins. Any amount of skill and inventive power might be brought to bear on such work. That the Mint has now in its employ those capable of it may well be doubted, but a public competition would doubtless discover those who are really capable of the work, and the time seems singularly opportune for it, as a new Master of the Mint is shortly to come into office. We would just add that it is a very great pity a selection of coins from the fine collection in the British Museum is not open to general inspection in the Royal Library or elsewhere.

C. B. A.

ULSTER BREWING COMPANY,
BELFAST.

THE dispute between the contractors, Messrs. Fitzpatrick, Brothers, and the Ulster Brewing Company was referred some time ago to

arbitration, and after some days spent in arbitrament, and numerous witnesses having been examined, an adjournment took place. A compromise was then proposed, we understand, by the Messrs. Fitzpatrick, who agreed to accept £2,200, and twenty-five shares in the concern, as a full discharge of their claim against the company. As we are informed, the amount claimed by the Messrs. Fitzpatrick and alleged by them to be due was about £7,000, so that it would seem to have been a very good settlement for the company.

NEVILL'S PATENT WINDOW.

A MODEL has been submitted to our (*Building News*) inspection of a new method of suspending and fastening windows, invented by Mr. Nevill, of Abergavenny. In a little pamphlet by the inventor, the fact is mentioned that during the last fourteen years, 112 patents have been granted for improvements in the construction of windows, and yet the old sash and frame is still almost universally used, notwithstanding all its inconveniences. The present window differs little from that in ordinary use in outward appearance, save in the simple and quiet way in which it is opened and fastened. The principal features are that all the lines of the sashes (and Venetian blinds when hung) are hidden from sight. The window is unfastened by partially turning round a small knob on the meeting rail, and slightly raising the hand, and the sash is opened, and by drawing down the lower sash to the sill, both the sashes become permanently and securely fastened. The turning of the knob pushes back the upper pulley stile, which is so hung at the top as to drop over the bottom sash when at rest, and at the same time that it moves the pulley stile it unlocks the top sash and both the weights, and frees them for action. And simply closing the sashes, again (that is putting them up or down as the case may require) effectually fastens both sashes, and so locks both the weights, and all strain is taken from the lines without the aid of springs, pulleys or cranks, by simply letting the whole fall into their places by their own gravity.

METROPOLITAN ITEMS.

The Public Health Committee met on Friday at the City Hall. During the past month 759 notices and 212 summonses were served, and 202 convictions obtained in sanitary cases. In no instance were summonses dismissed. 23,800 lbs. of diseased meat, 2,200 lbs. of stale fish, and a large quantity of unsound fruit, exposed for sale, were condemned and confiscated as being utterly unfit for human food. The seizure of these articles involved 39 detections; 9 analyses were made of milk and articles of food; 174 dwellings, in which infectious or preventible diseases occurred, were cleansed and disinfected; in 3 instances chemical disinfection was found necessary. The death-rate has continued throughout the month to be less than that in London, Edinburgh, Glasgow, and Birmingham.

A special meeting of the Corporation was held on Friday, to take into consideration a resolution of Committee No. 3, passed on the 16th ult., accepting a certain tender for the supply of state six-horse harness for the state-coach. A deputation from the "United Trades Association" was introduced, and a memorial received from them, praying that no tender should be accepted, except from one of those firms that act on the principle of "Live and let live;" that is, those who employ only members of the Trades Union. After considerable discussion, the resolution of No. 3 Committee was rescinded. It was agreed that the harness, which, it was stated, is perfectly rotten, having done duty for 80 years, should be rendered fit to take its place in the usual New Year's Day ceremony, the question of replacing it by new harness being postponed until after that date.

* From the *Building News*.

HISTORICAL AND ARCHEOLOGICAL ASSOCIATION OF IRELAND.

THE October meeting of this Association was held at Butler House, Kilkenny, on the 20th ult., Richard R. Brash, Esq., M.R.I.A., in the chair.

The following were elected as members:—John N. Bagwell, Esq.; Henry Munster, Esq.; John Thomas Blight, Esq., F.S.A.; William J. de Vismes Kane, Esq., M.R.I.A.; Mrs. Delahunte; William MacDougall, Esq.; Rev. Maxwell H. Close, M.R.I.A.; Rev. Mr. Tommins; Richard L. Whitty, Esq.; Rev. James O'Laverty, M.R.I.A.; David Wilson, Esq.; A. A. Hill, Esq., A.R.I.B.A.; George Zair, Esq.; Henry S. Noblett, Esq.

The Rev. James Graves presented to the museum an ancient guard ring or ferrule, of bronze, found in the interior of St. Canice's Cathedral.

Mr. A. S. Geoghegan presented a photograph of a small sepulchral urn, with ears or handles, found by Mr. Corvie, of Londonderry, in the same locality as the two urns mentioned in a former number of the Association's "Journal."

The representatives of the late George V. Du Noyer presented a number of rolled flint flakes, from the drift, found by that gentleman—42 at Holywood, county Down; 13 at Kilroot, near Carrickfergus; 9 from a gravel pit at Reagh Island, Strangford Lough, Co. Down; and 14 from Island Magee, county Antrim. These objects gave rise to an animated discussion.

Mr. R. Malcomson, Carlow, sent for exhibition some interesting objects, which he thus described in a letter accompanying them:—

"1st—A very highly-finished and exquisitely-polished stone celt, picked up by a peasant boy in digging at a place called Tristia, in the county of Mayo, during the present autumn. 2nd—The official seal of Thomas Sisson, a notary public of Dublin, in the reign of Charles II., with the date 1671. A wax impression from the seal accompanies it, which may be deposited in the museum, if deemed worth preservation. 3rd—A crucifix found at Thurles, county of Tipperary. I am desirous of having the opinion of the members as to the use and probable age of this last relic. The material is copper; but it had evidently been gilt and enamelled—a portion of the blue enamel still adheres to it, and when discovered I believe it was perfect in that respect; but having been given as a plaything to children by its finder, the 'delph,' as he called it, was broken off by them. It would also seem to have been thoroughly gilt, as portions of the gilding are discernible on the joints and arms of the cross. It appears to have been intended as a fixture, as it is supplied at the base with a tongue or point to fit it to a socket, or attach it to some other object."

The Rev. John Darby observed that the cross had a very Eastern look, and what confirmed him in this view was the Greek monogram, for the names of the Redeemer, X.P.S., I.H.S., "Christos Iesous," above the Saviour's head.

Mr. Bracken, C.I., said it was very like some Russian crucifixes which he had seen. It might have been brought home by some of the soldiers from the Crimea.

The general opinion of the members present was, that the age of this very interesting object was not likely to be more than the sixteenth century. It would seem, although not large, to have been used as a processional cross, as the tongue or point at the end would seem to have been intended to attach it to a staff.

Mr. Robertson showed, from his collection, a stone celt, polished and apparently of the same stone as that of Mr. Malcomson, though his (Mr. Robertson's) was larger. Both these celts were much admired.

Dr. Barry Delany, on the part of the Rev. Mr. Keleher, P.P., Kinsale, exhibited some interesting Kinsale penny tokens, and other coins found in that locality.

Mr. Graves read a communication from Mr. John Fitzgerald, of Holycross, near Kilmallock, on the subject of the ancient Irish

bronze spear recently described by Colonel Lane Fox before the Society of Antiquaries, London. He stated that the spear-head with a gold ferrule, and only so much of a wooden handle as served to keep both these objects together, were found by a man named James O'Brien, at the draining off the water from Lough Gur. O'Brien presented them to Lord Guillamore, under whose directions his lordship's carpenter supplied the present handle from a piece of bog oak found elsewhere; Lord Guillamore himself using the gold ferrule as an ornament for his watch-chain. He (Mr. Fitzgerald) therefore considered that the gold ferrule at present on the spear-handle was not the original, and that in fact the head was the only original part of the spear now in Colonel Lane Fox's possession.

The chairman stated that, having seen the present gold ferrule, he had no doubt it was not modern, but must have been the original one, which Lord Guillamore had perhaps restored to its original use before his death. As to the present handle, he was not surprised to find Mr. Fitzgerald testifying as to its not having been the original one, as he had been very suspicious about it when he saw it.

General Duane communicated the particulars of the finding of some ancient wooden instruments recently, in a bog on his property at Brittas. Two were of oak, apparently cut out of a solid piece, with long handles, and a head-piece of wood attached, like a hoe. Others were like corn-shovels, and there were pieces of wood bored as if by an augur, and a barrel of well-formed staves, 25 in number, which fell to pieces on being raised. The staves were not bound, but kept together by dowells of wood.

Mr. J. S. F. MacKenzie sent an account of an exploration made by him and Mr. Prendergast, of Ardinnan, county of Tipperary, in a rath on the land of the latter gentleman. They found there was a succession of chambers, of a beehive form, beneath the rath, the entrance being by an arched opening always visible, but which had been choked up with rubbish. On removing the rubbish they found a descent of four steps, cut out of the solid rock, leading to the first chamber—of an oval, bee-hive, dome shape,—built entirely of rough, unheaved stones, the dome roof formed by each succeeding tier overlapping by a few inches the one immediately below, and the whole crowned by a small flag. A narrow passage led from this into the second chamber, and another passage from thence to the third, these being similar to the first chamber. Amongst the earth taken out they found a quantity of small bones, a small hone, the tusk of a boar, a small piece of bronze, which showed marks of having been cut with a sharp instrument into a sort of ornament, and two small pieces of iron.

Mr. Fitzgibbon, Crogham House, had written to Mr. Graves to inform him that he understood some bone pins and charcoal had been found in the chambers at Ardmore, although Mr. MacKenzie had not mentioned this in his letter.

The chairman pointed out the importance of accurate descriptions of the opening of such chambers, and insisted on the necessity of the greatest accuracy in noticing everything found.

Mr. Graves said it was considered that there were two chambers yet unopened at Ardinnan. Mr. Prendergast had invited him to go see the exploration made, which he intended to do, and he would note most carefully anything found on the occasion, and report to the next meeting of the Association.

The chairman read some notes on Ogham investigations, in which he took occasion to correct what he considered had been errors in his previous readings at Ardmore and at Glounaghlough, the latter in the county Cork. Mr. Brash remarked as to its being curious that he had found so many of the persons commemorated in Ogham inscriptions described as swineherds.

Mr. Charles Butler Stoney gave an account of an old road discovered through a hog near

Portland, in the county of Tipperary. He was informed by a peasant of the locality that about a quarter of a mile of the road had been dug away in cutting turf, and only about four perches of it were now apparent in an angle of cut-away bog; but he thought it probable that the road was carried on to the Shannon, through the callow land which intervenes between the hog and the river, which an excavation would determine. The land was the property of Lord Clanricarde.

The chairman also contributed a paper on the sculptural ornamentation of the ancient sepulchral crosses of Ireland, showing how the groups of figures there depicted illustrated the ancient dress, implements of war and the chase, and the manners and customs generally of the olden inhabitants of the country.

Amongst the other papers brought before the meeting were the following:—

"On the Architecture of the little old Church of Killaggy, near Killarney," by the Rev. G. H. Reade.

"On the Copper Tokens issued in Ireland from 1728 to 1761," by Aquilla Smith, Esq., M.D.

"On Megalithic Structures near Cleggans Bay, County Galway," by G. H. Kinahan, Esq., M.R.I.A.

"On the Ruins on Innishshark, County Mayo"; also by Mr. Kinahan.

The chairman said that, before the meeting separated, he wished to make a suggestion. Their association had become a national—a truly national, society. There was one thing which would, then, be worthy of such an association, if it could be accomplished. In the Book of Ballymote, the Book of Leinster, and other ancient Irish manuscripts, there were many tracts of great value bearing on ancient Irish history, laws, manners, and customs. If such could from time to time be brought forward in the "Journal," with translations and annotations by competent Irish scholars, they would achieve an important national work indeed.

Mr. Graves observed that when the number of the "Journal" of the Association now being issued came into the hands of the members, it would be found that Mr. Brash's idea had already been acted on. That most ancient of our Irish religious compositions, "The Hymn of St. Patrick," had been printed from the "Liber Hymnorum," with an introduction, translation, and notes critical and exegetical; and supplemented by an Essay on the Religious Beliefs of the Pagan Irish, illustrated by passages from our most ancient MSS., and correlated with the Paganism of ancient Gaul. He (Mr. Graves) was very much mistaken if these papers of Mr. O'Brien Crowe's should not be looked on as valuable contributions to Irish philology and history.

The chairman said he was very happy indeed to find that so good a beginning was already made in the important direction which he had taken the opportunity of hinting at.

On the motion of Mr. Bracken, C.I., seconded by Mr. Robertson, thanks were voted to donors and exhibitors, and the chairman declared the meeting adjourned till the first Wednesday in January, 1870.

ARCHITECTURAL ASSOCIATION, LONDON.

THE opening meeting of the session 1869-70 was held on the 29th ult. at 9, Conduit-street. The president, (Mr. L. W. Ridge) delivered an address, of which the following is an abstract:—

After a few brief remarks respecting the association and its meetings, Mr. Ridge went on to say "There were deep reasons why these mixed gatherings should not be allowed to fall into a state of absolute silence. To develop one such would be his object in the few words he was about to speak. The fine art architecture might be shortly defined as the art of superadding beauty to that which was useful. Man needed a building that therein some special object might be performed. Architecture enabled him to make

it beautiful. In the middle ages, a bishop wanted a building where men might meet in crowds to do honour to their God. The architect proportioned the parts thereof that it might be beautiful. He vaulted the roof, moulded the arches, carved the capitals; he made windows for light, and gave them beautiful forms; he glazed them as a protection from the weather, but he painted the glass for beauty. He wanted more colour, so the painter brought his art, and therein told a wondrous tale. There were doors which the sculptor beautified; there were towers for bells, and these the architect grouped in lovely outlines; and a cathedral was built. Now, here, as in the building itself, so in its detail, we find, first, a requirement supplied, and then beauty incorporated in the work by the art of the architect; and this operation of combining utility with beauty is not confined to buildings or even to the details thereof, but finds a field for its exercise in every kind of manufacture. The constant presence of wants to be supplied, while it is the groundwork of all true styles of architecture, and the great hindrance to all styles that are false, is the very reason for the existence of all industrial manufactures. A constant view to utility and the true love of beauty are the requisites alike of the architect and designer of manufactures. Their art is identical. In fact, it is the one great art, Architecture, that governs the whole. It is important to establish this, because many who enshrine architecture in the Academic circle of fine arts with painting and sculpture, are surprised when asked to regard some common thing of daily life as a work of fine art. The furniture, the tapestry, the pottery, the glass, the dress of every-day life are, however, as capable of receiving art treatment as buildings themselves. When in times past building has flourished the art in these things has flourished too, and when architecture declined, first one manufacture, then another, fell under an art-less tradition. In thus claiming an extended sway for architecture he was not anxious to increase the province of architects. Speaking generally, it may be said that when art most flourished we hear least of architects. It is as with the saints of ancient times. When the world was most wicked, then they most abounded, and their deeds stood out in high relief, whereas in the general decency of more modern days the character is unknown, or, at least, unrecognised. In some respects the existence of architects is abnormal, for surely each man should be the best designer in the branch of art in which he works. In buildings, however, where so many arts are brought together, a chief is indispensable, and at this period, when all the subsidiary arts have fallen into a state of decadence in which each is inconsistent with the others, some race of men who will study abstract design may well be tolerated. His object, therefore, in setting forth the close connection, or, rather, the identity of art in buildings and art in manufactures had rather been to remind his hearers of the Architectural Association, on the one hand, that the result of their studies must be to establish principles for their art, which should be applicable not in buildings alone, but in all manufactures; and to claim, on the other hand, that the true principles of architectural art should govern all works of industry. A constant view to utility is, however, the greatest bond of all. By its character or style is imparted to the object, be it building or manufacture, in such a way that the very expression of use becomes a great source of beauty. During the past year a market has been erected, with extreme munificence on the part of the donor, at the East End of London. It would possibly be remembered that, in the descriptions of Columbia Market which appeared in the daily press at the time of the opening, certain decorations and parts of the building were spoken of as ecclesiastical. Now, the character of the artistic criticism which appears in non-professional journals is such that it is quite possible this word might have been used to express the forms of a style of architecture which was just as applicable to and

just as much used in civil and military buildings as in churches, and if so all may be well. If, however, any features or decorations did really suggest to intelligent minds that they would be more appropriate in a church than in a market, then such features and decorations were worse than useless. They tended to destroy the character of the building—they made it less fit for a market, and were sins against the laws of artistic utility. Now, to turn to a manufacture. It was an extremely familiar one, but that added to its value as an illustration. Take an ordinary table-knife. It is simple enough, and, at first sight, useful enough. It is constantly used to cut things laid down upon a plate, with a part of the blade near the end. That the work comes almost entirely on one point may be seen at once by looking at knives that have been long in use. This fact, however, never entered the head of the designer of the knife, or, at any rate, he disregarded it. Take next, an old-fashioned table knife, such as lingers among the old inhabitants of country houses. We find a long sweep given to the part of the blade at which the cutting takes place, the point strengthened with additional metal, a place provided for the fore-finger, and a whole produced, which, while it is quite as useful for such purposes as cutting bread as any other knife, is characteristically and essentially a table-knife far more utilitarian than the other, for it will far longer endure the special work for which it was designed; and it is a work of art, for it displays thought, and has given its designer an opportunity of introducing graceful curves and outlines. In the first case, we have a knife which satisfies a simply utilitarian age: in the second case we have more utility, with character and expressed purpose, with thought and art. Mr. Ridge insisted on this quality, this derivation of the art from the use, because in this rested the only hope of associating the practical utilitarianism of the age with art. By this only can we hope to persuade the commercial man of "per cent." to entwine art with his manufactures—by this only can we hope to arouse the lethargic public and to persuade them that architects are something more than antiquarian pedants, and architecture more than an obsolete amusement. Now, if the art of architecture may be thus legitimately extended into every manufacture, if it should constantly intertwine itself with everything that is truthful around us, have not all, even those who have the least connection with the architectural profession, some share in the matter? In conclusion, he asked his audience to share with the members of the architectural profession their position as artists, and in the common things of daily use to be patrons of art.

ANTIQUITIES OF ROME.

We (*Builder*) have received the third part of "A Catalogue of 1,500 Photographs illustrative of the Archaeology of Rome," prepared under the direction of Mr. John H. Parker, F.S.A. Printed for private circulation. We are not surprised that Mr. Parker does not think it expedient to publish this in its present imperfect state: it is natural that he should wish to make it complete before it is published; but, considering what a great undertaking it is, and that he has been already five years about it; remembering also the uncertainty of human life, and that he may never live to finish it; we are glad that he gives as much publicity as he can to what he has already done. He bids fair to produce the same sort of revolution in the archaeology of Rome that Rickman produced fifty years ago in England, to put the subject into a new groove which others will soon follow, and the next generation will derive the full benefit of what he has set going. It is the application of this system, the close examination of detail and comparison of one with another, of less perfect remains on one spot with more perfect remains of the same kind and of the same period in another place, which forms the basis of modern archaeology. Mr. Parker has also sent us proof sheets of his chrono-

logical table of buildings in Rome from the foundation to the time of Constantine, with the authorities for the dates. These two things ought to go together, and to be published together.

He has marked in the table all the buildings of the remains of which he has photographs, so that a scholar or an archaeologist can now, with the help of a good magnifying glass, judge for himself whether the dates Mr. Parker boldly puts upon them can be relied upon; he has given the means of correcting them if he is in error. We observe that he lays great stress on the primitive earthworks as having governed the plan of the city, and dictated the sites of the principal buildings, and often the plan of a building also. We suspect that the same will be found to be the case with many other ancient cities and castles. This is a new subject for investigation, which has hitherto been overlooked. We are sorry to see that he states that his funds are exhausted, and that he cannot carry on the work he had undertaken in Rome without assistance. He has not called on others to help him until he had done the utmost that his own means allowed, and we trust the example he has set will be followed. We have heard it whispered that he received as much as £10,000 (all now expended on archaeological objects) from the estate of the late Robert Stephenson, the engineer, which, though legally at his own disposal, he chose to consider as trust money only for archaeological purposes, and, therefore, devoted a moiety to this object in Rome, believing that such would have been the wish of Stephenson could he have been consulted. We gather from the end of the catalogue that persons desirous of assisting in this work can do so by paying donations to the Roman Exploration Fund, at Messrs. Coutts's, of which Mr. Parker is treasurer.

NEW BLACKFRIARS BRIDGE, LONDON.

THE *Times*, in describing the new bridge, which was opened on the 6th inst., says: "In this iron age we expect to find that iron has taken the place of stone as the chief material for spanning the river anew. More than 5,000 tons of it have, in fact, been used. The arches are of wrought iron, springing from piers of Cornish granite (from the De Lauk quarries, near Bodmin), with a heart of brick-work. On these piers rest columns of red granite from Mull, standing on a carved pediment of white Portland stone, and surmounted by massive capitals of the same material, on which are carved aquatic birds, flowers, and sea and river weeds, admirably designed and executed by Mr. J. Birnie Phillip. These columns are unique of their kind. They are only from 10 ft. to 12 ft. high, and as they have the enormous diameter of from 6 ft. 9 in. to 7 ft. 3 in., they look somewhat too solid and stumpy. Each column cost upwards of £800, and each consists of no more than three stones, beautifully polished, and the largest weighing from 10 to 14 tons. On these columns are placed eight deep recesses, four on each side of the bridge, where weary travellers may find welcome, though not luxurious seats on slabs of granite. The recesses, which are 10 ft. deep by 13 ft. wide, break what would otherwise be a rather monotonous line. The cast-iron balustrade is in the Venetian-Gothic style, which has been followed in the ornamental parts of the bridge, and harmonizes well with the rest of the work. Like the iron-work, it is painted a bronze-green. It looks rather low, and is only 3 ft. 8 in. high; but this, we believe, is somewhat higher than the balustrade of Westminster. The cast-iron ornaments at the intersections of the lattice-work are now being picked out with gold on a portion of the western side of the bridge. This work, when completed, will give increased lightness and life to the whole structure, and the bronze green, the gilt, the polished red granite, and the white carved stone work will afford admirable contrasts."

OAKLANDS, COUNTY TYRONE.

OAKLANDS, the residence of Lord Viscount Stuart, which forms the subject of our illustration for this No., has been rebuilt from the designs of Mr. Wm. Hastings, architect, of Belfast, by the well-known builder, Mr. John Murphy, also of Belfast.

The mansion has been planned with a large central hall as the chief feature, with which all the principal apartments communicate. This hall rises the full height of the building, and is lighted from the roof. On the level of first floor a gallery, about 6 ft. wide, runs entirely round the hall, carried on carved oak corbels, resting on stone caps built into the wall and elaborately carved; from this gallery all the principal rooms on first floor are reached, and access to it is by means of the grand staircase of stone, having richly-carved stone newells and wrought-iron ballusters. In proximity to this hall is the large dining room, 35 ft. by 20 ft., and in connection with it are three reception rooms arranged *en suite*. These rooms occupy the front portion of the building (as seen in the view). A passage beside the grand hall leads to the minor portion of the building, comprising the necessary kitchen offices, housekeeper's room, servants' hall, butler's pantry, &c. A back staircase leads to the apartments over this division of the building; from the landing of this stair access is had to the first floor of tower, and from thence to the top by a circular stone stairs in turret. In the tower is situated the smoking room, and from the summit is obtained a splendid panoramic view of the surrounding country. The kitchen offices are grouped round a large kitchen court, thereby securing ample light and ventilation, &c.

Altogether the aspect of the building is extremely good, and the numerous breaks and projections produce a variety of light and shade which is very pleasing. A small portion of the old building has been retained—that occupied by the rooms in front,—and this has been remodelled to correspond in every respect with the new building.

The building is situated on an eminence, which adds much to its general effect. The building has been executed entirely of white freestone, quarried in the neighbourhood by Mr. Murphy at considerable expense, and as a specimen of it has been forwarded to us, we have no hesitation in saying that a more excellent building stone we have not yet seen, and it is certainly a matter of regret that it is not generally available.

The retention of the old portion of the building presented a difficulty to the architect which has been creditably overcome, as the old and new portions are in perfect harmony.

The cost of the building has been about £10,000, and we understand the work has been most carefully executed by Mr. Murphy, who had, as his representative at the works, Mr. Robert Flanagan, and the clerk of works was Mr. Henry. The plumber's work was executed entirely by Mr. John M'Gee, of Ann-street, Belfast.

BATH STONE.

RANDELL, SAUNDERS, AND COMPANY, LIMITED. MESSRS. Randell and Saunders, quarrymen and stone merchants, Bath, have issued a circular, in which they announce that in future their business will be conducted as a limited, but private, joint stock company, under the name of "Randell, Saunders, and Company, Limited." No change will be made

in the management of their business: it will remain in the same hands as before. The shares of the company (they state) will not be open for public investment; they avail themselves of the Limited Liability Act, not to dispose of their business, but to reconstruct their partnership in a convenient form. The objects they have in view in this arrangement are—to give greater facility for the extension of their business in the Bath stone trade, and to incorporate with it the quarrying and selling of other descriptions of building stones. They purpose also to associate with them in the business some of their staff who have been for many years in their service. Their advertisement will be found on our second page.

SOCIETIES' MEETINGS.

ROYAL DUBLIN SOCIETY.—The first evening scientific meeting for the session of 1869-70 will be held on this evening, in the Lecture Theatre. Communications—Wm. Andrews, Chairman of the Natural History Committee, "On Deep Sea Soundings." A. G. More, Assistant in the Museum of Natural History, "Exhibition of some rare Specimens of Natural History lately collected in Connemara for the Museum." W. F. Kirby, Assistant in the Museum of Natural History, "On a Natural History Excursion on the Continent in the spring of 1869." For Exhibition—An engraving of the Nebulæ in Orion, presented to the Society by the Earl of Rosse. A large electro-magnet.

In the report of council for past year, read at stated general meeting on Thursday last, the following passages occur:—

"BOTANIC GARDEN.—The curvilinear range of conservatories have, in the course of the summer, been doubled in extent—a work which whilst affording increased accommodation for plants, and a large space for visitors, adds greatly to the beauty of those much-admired houses. Donations and exchanges of plants have been made with most of the principal botanical gardens in Europe, more especially with those of Kew, Hanover, and Berlin.

"FINE ARTS.—The School of Art has resumed its business, with every prospect of increased success. The number of students, especially in the classes for artisans, is very much larger than in any previous year. A beautiful sketch model of the statue of Edmund Burke has been presented to the society by the artist, J. H. Foley, Esq., R.A., who was himself formerly a student of the School of Art. The council recommend Mr. Foley for election as an honorary member.

"LIBRARY.—The Library continues to be much used by members and introduced readers—the average number of the latter during the last fortnight having amounted to 47·8 in the day-time, and to 33·7 in the evenings; the highest number of the former amounting to 59, and the latter 52.

"NATURAL HISTORY MUSEUM.—This department is, in most respects, in a very creditable state. The experiment was tried last year of opening the Museum to the public on one evening in the week. At first the number of visitors was small, averaging 150 on each evening. Latterly, however, the number has increased to between 700 and 800. A desire to visit this instructive department having been thus unmistakably manifested by the public, the council hope to be enabled to make arrangements for opening the museum on two evenings in the week, and to admit the visitors by the Merriam-square entrance.

"PRACTICAL SCIENCE.—The series of afternoon scientific lectures delivered during the last spring in the Society's Theatre was most attractive, the average attendance at each lecture being 346 persons."

The honorary officers were elected as follows:—*Vice-Presidents*—Earl of Clancarty, Marquis of Kildare; George Alexander Hamilton, LL.D.; Lord Talbot de Malahide; Rev. Humphrey Lloyd, D.D., F.R.S., Provost, T.C.D.; Sir Richard Griffith, Bart.; Right Hon. Lord Clonbrock. *Secretary*—George Woods Maunsell, A.M., D.L. *Professor* (honorary) of *Artistic Anatomy*—Alex. Macalister, M.D. *Professor* (honorary) of the *Fine Arts*—Henry Macmanus, R.H.A.

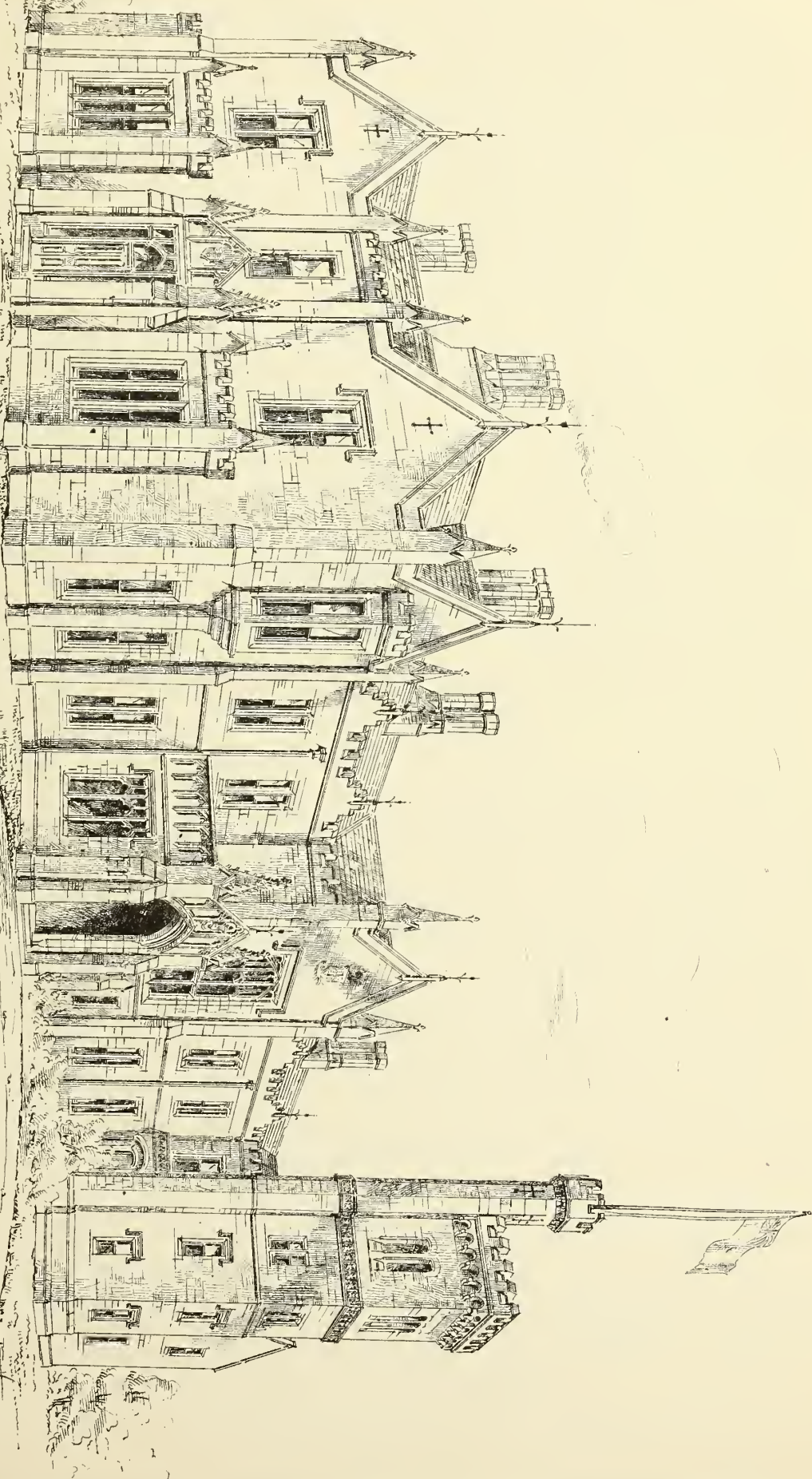
ROYAL INSTITUTE OF THE ARCHITECTS OF IRELAND.—We trust there will be a full attendance of the members of the Institute at the opening meeting of the session 1869-70, which

will be held on Thursday evening next, "to receive the annual report of the out-going council and the treasurer's statement of receipts and expenditure, and to elect the council and officers for the ensuing session." Mr. J. H. Owen will read a paper on "Damp." To be submitted for ballot—As Fellow, John Joseph O'Callaghan, 3 Upper Merriam-street, Dublin. Recommendation papers to be read—As Fellow, Henry Chappell, Newtownards. As Associates, William Butler, 123 Strand Road, Sandymount; John L. Robinson, Student, Cloughton Villa, Booterstown. As Non-Professional Associate, George Booth, Clock Maker, 7 Stephen's-green, Dublin. Attention is called to the conditions on which the Prize of the Session will be awarded, as already announced.

ROYAL GEOLOGICAL SOCIETY OF IRELAND.—A meeting of this society was held on Wednesday evening in the Museum Buildings, Trinity College; Dr. Wm. Stokes presided. The Rev. S. Haughton read a paper "On the discovery, by Mr. W. H. S. Westropp, of Albite Felspar in the Dalkey Granite, and on the importance of this discovery in the correlation of the Granites of Leinster with those of Mourne and Cornwall." He said he considered the discovery one of the most important that had been brought before the society since its formation. He affirmed this, speaking as an experienced observer of the granite formations in England, Scotland, Ireland, Norway, Sweden, and Finland. The credit of the discovery was due to a junior member of the society. Professor Haughton then proceeded to describe the circumstances of the discovery, and the result of an analysis of the albite felspar found in the Dalkey granite. Mr. Westropp said it gave him great pleasure to be in any way service to the society, and he might mention that the discovery had been merely made by accident, as his attention had been called to the peculiar colour of the granite found at Dalkey. Dr. Macalister read an interesting paper on "Human and Canine Bones, now in Museum of Trinity College, Dublin, discovered by M. H. Ormsby, Esq., Geological Survey, India, in the celebrated cave Uainh Fraing, Island of Eigg." Dr. A. W. Foot read a paper on "Human Bones of great antiquity discovered in the Cave of Dunmore, county Kilkenny." The following geological specimens were exhibited:—Specimens of the gold-bearing quartz-reef of S. Australia, by Mrs. Gray, of Nareebnareeb; specimens of the gold-bearing quartz-reef of Mentena, Rocky Mountains, by Dr. Trevor; flint cores from Jubulpore, Bengal, by Valentine Ball, Esq., Geological Survey, India.

EDINBURGH ARCHITECTURAL ASSOCIATION.

THE following is taken from an address delivered by Mr. William Brodie, F.S.A., at a recent meeting of the above body:—"I would fain hope that we are now in a fair way to do something better and higher in ecclesiastical architecture than has been done for many a day. Let us only put our minds to the work in the spirit which actuated our forefathers, and we need not despair of leaving behind us some architecture worthy of the advanced age in which we live. No work of really high art in painting, sculpture, or architecture can be done except in the spirit of devotion which actuated those great men of the olden time. I do not think there are any of the arts which require a more extended range of knowledge than architecture. One has only to consider for a moment what the architect has to do in order to find out what ought to be the range of his studies. In his work he must first look to its utility. It is absolutely necessary that a building should fulfil the purpose for which it is erected; and to do this efficiently, he must first study well the ground on which his edifice is to be founded. Without a good foundation, all building is vanity. It must be strong, and for this purpose, perhaps, his geometrical knowledge may be found the



Hereby.

STOKLANDS, C. GYRON & THE RESIDENCE OF LORD VISCOUNT SUTHERLAND.

Stoklands, Gyron, Sutherland.

Stoklands, Gyron, Sutherland.

THE LIBRARY
OF THE
UNIVERSITY OF TORONTO

most useful. It must be properly lighted, heated, adapted for sound, and ventilated; and for all these he requires to be a good natural philosopher. He needs, also, beyond all, to have a sound practical knowledge of all the multifarious requirements of a household, and an aptitude for providing for them. It is no uncommon occurrence to find, after an unlimited outlay on a house, that it is deficient in some of the most essential comforts, and has to be remodelled and altered, without even then being what it was intended to be; and all this has to be attended to before he thinks at all of his duty as an artist, when it is necessary that his work should be considered as "a thing of beauty." Having had to provide for so many and such very different wants, the parts of his work must be of the most varied description; and yet a new element now comes in which renders it necessary for him to blend and harmonise all the heterogeneous mass into one work of art, and that not only for effect seen near at hand, but also afar off. Not only on one side, but on all sides, must the aspect be agreeable and effective, or else, however useful the building may be, it will not be ornamental, nor will it belong in any way to the Fine Arts. Yet how often do we find that those who have never bestowed a serious thought on many or perhaps any of these things, take upon themselves to perpetrate their enormities in the face of high heaven; and there they are—"whene'er we take our walks abroad," our eyes are tortured and our taste outraged by the most hideous abortions, which obtrude themselves on our sight whether we will or no. We cannot get rid of them, they are too large to be passed over, and they are too permanent to be swept away. Ornamentation with us is almost exclusively æsthetic; we do not use it much for symbols. Ornament is founded chiefly on geometric lines and conventional treatment of natural objects; and to the selection, arrangement and adaptation of these must the artist's attention be directed. By merely repeating and contrasting straight and curved lines, an immense variety of ornament may be evolved, as has been demonstrated by various writers, and is shown very well by Sir David Brewster's beautiful invention, the kaleidoscope. It should not be the main object even of the painter or sculptor to imitate too closely natural objects, for in that respect pre-Raphaelitism fails; and if it is not the province of the sister-arts, how much less it is the business of the architect to make naturalistic monstrosities. The painter or sculptor professes to give, not certainly the exact representation of the objects, but as far as in him lies to convey to others the exact idea which they suggest. With the architect it is still less an exact representation that is required; with him ornamentation is the sole purpose, and from whatever natural object he takes his ideas, for him they must not be an exact representation either of leaves, flowers, birds, or beasts, because what he wants them for does not profess to be either tree, plant, or animal, but an architectural structure, and whatever is in it or on it must be subject to and in harmony with the whole intention, purpose, and appearance of the work. Naturalistic ornamentation may be good or bad, but with the architect it is out of place. It may be good or bad for some artists to adhere strictly to nature, but it is not for the architectural ornamentalist to do so. Whenever an ornament becomes like a picture, it is out of its sphere; and however beautiful it is, it is not in its proper place, just in the same way that, when a picture becomes ornamental in its arrangement or design, it is immediately lowered in style. The two things are separate and distinct. Symmetry is, perhaps, the greatest of all properties of ornament—in fact it is, I believe, its foundation; and it is extraordinary what can be done with the simplest lines if they are symmetrical—for instance, the Greek fret, geometrical lines, &c. But for the highest kind there must be more subtlety of line introduced, and that we get from a study of natural objects more readily than by any other means, always under the restrictions which I have already

stated. Let the harmonious effect of your works be your principal artistic object, and next to it, that the individual parts should stand individual inspection. In an artistic view, what is there more constantly giving pleasure or pain than architecture? We see it everywhere. A fine architectural work will be "a joy for ever" to countless thousands, who will gaze upon it day by day, and cannot help gazing upon it; for it is not like painting or sculpture, which are to a certain degree limited in their display. It looms too large to be passed over. It stands in too public a place not to be seen. Multitudes will be the better or the worse for it. They will either be elevated and educated by the contemplation of a fine work, or they will be debased in their taste and rendered unhappy by the sight of an abortion. Every time they see it—no matter how often—the oftener the worse. The bad impressions will be deepened, "as streams their channels deeper wear." To execute any work of art of the highest style requires a master mind, and such are not sent into this world but at long intervals. There has been but one Ictinus, one Phidias, one Michael Angelo, and such, I hold, to be special creations—direct emanations from the Deity. No development will produce them, nor will any circumstance prevent them fulfilling their proper mission. I am very doubtful of the "mute inglorious Miltons." Without laying a claim to being such geniuses, however, we may do good work in our several spheres, and if by any chance a Michael Angelo should come amongst us, we shall most heartily welcome him.

THE CONVERTIBILITY OF FORCES.

WITHIN the past week the following communication was addressed to the secretary of the Armagh Natural History and Philosophical Society by its learned ex-president, Dr. R. Robinson, and has appeared in the *Ulster Gazette*:—

Perhaps the specimen herewith may interest some of the members of the Philosophical Society, and even be thought worthy of a place in the museum. It is a piece of iron wire which was melted in my presence by the marvellous magneto-electric machine of Mr. Wild, Manchester. This machine, far surpassing in power anything of the kind that has as yet been constructed, is a beautiful illustration of the great fact to which your president called attention in his inaugural address, viz., "the convertibility of forces." It consists of just twenty magnets, of no remarkable size or power, which stand by these homologous poles on two pieces of soft iron, which are, of course, magnetized by the contact of the magnets. Between these revolves a metal cylinder, parallel to them, which can be driven at any required speed, by steam or any mechanical power. Round this cylinder are wound in the direction of its length several turns of stout copper wire (lapped with cotton, to insulate them). The well-known result of this arrangement is, that whenever the coil of wires passes near the magnetic iron bars already mentioned, a current of electricity is produced in it, and another current in the opposite direction, when it recedes from them. The result of this is, that in each revolution of the cylinder four currents are produced in the coil. By an arrangement, well known by the name of commutator, these four currents can all be thrown into the same direction. So far, this is only an improvement on what has been done before, and the currents so produced are moderate in quantity—such as would heat to redness two or three inches of fine platinum wire. But Mr. Wilde conceived the happy idea of directing these currents through a very powerful electro-magnet, and thus developing in its poles a magnetism enormously greater than that of the twenty magnets which originated the currents.

The poles of this magnet are provided with a revolutionary cylinder, or armature, as it is called, similar to the first, but very much larger, and, like it, made to revolve rapidly

by mechanical power. The electricity which is developed in this during its rotation is of prodigious quantity, and the effects which it produces surpassed in brilliancy anything I had before witnessed. Amongst others was the fusion of the piece of iron wire which I send with this in a quarter of an inch diameter, and 15 inches long, held horizontally between two strong metal supports, which were connected with the machine in action. In a few seconds it smoked, became blue, reddened, and at last of a white keel, so dazzling that the eye could scarcely look at it, then softened, and sank down into a curve. The metal, as it melted, flowed like a viscid fluid down to the lowest point of the curve, whence it dropt like "tears of iron," some of which I send also. The heat continued to increase till it could no longer bear its own weight, which broke it into four pieces.

The power of the current which produced this effect will be more fully appreciated if we remember that *soft* iron requires for its fusion 2845° Fah.—a heat which is scarcely producible in our best furnaces; and that a wire of this size would probably conduct, uninjured, a flash of lightning such as is usual in this country. And yet this flood of electricity is nothing else than a transformation of the mechanical power by which the armatures are driven. It does not proceed from the magnets; they might stand for ever, were the machine at rest, without developing any action whatever.

If the armatures be slowly turned, a small quantity of electricity appears; increasing the speed, the current increases, but with it a resistance to the motion is felt; increasing the speed farther as the electricity increases, so exactly in the same proportion the resistance increases; that is, the motive force is absorbed, till, as at the time when I saw it, the whole power of an eight-horse engine was expended in keeping up the action. During this time the magnetism of the twenty magnets originally referred to remained unimpaired, so that the result was simply the transformation of mechanical into electric force, the one being the exact equivalent of the other.

NOTES OF WORKS.

The foundation stone of the new Roman Catholic Church of St. Mary, at Carrigtwohill, Co. Cork, was laid on the 4th inst. by the Right Rev. Dr. Keane. The building will be in the Gothic style, and consist of nave and aisles. The interior dimensions will be 110 ft. by 50 ft. The material to be used in walls will be sandstone facing, with dressings of Bath stone. Mr. G. C. Ashlin, of St. Stephen's Green, is the architect. Mr. Newstead, Fermoy, the builder. The cost will be somewhere about £2,500.

In addition to the "recent works in Derry" printed in our last issue, we have to announce that Messrs. John Gallagher and Co., Shipquay-street, are entirely rebuilding the "Golden Fleece," which will be an immense improvement to the Diamond and Shipquay-street. The architects are Messrs. Godwin Brothers, London and Londonderry. The builders are Messrs G. and R. Ferguson. The Foyle Rope Work Company will also have erected shortly, at the Yellow Strand, excellent and substantial works, for which Mr. Robert Collins, C.E., is the architect, and Mr. Robert Maxwell the builder.

The first stone of a new Roman Catholic church at Balheary, Co. Dublin, was laid on Thursday last. It will be in the Gothic style, and consist of nave and chancel, with sacristy, &c. Messrs. Conolly, Dominick-street, are the contractors. It is estimated to cost £1,500.

The Holborn Viaduct, London, inaugurated on Saturday, is said to be exhibiting signs of serious defects. Eleven of the columns have exhibited serious flaws or cracks. The columns are of red Mull-of-Ross granite, and it is thought the material is not adapted to sustain an enormous pressure.

BOOKS RECEIVED.

The Theory of Strains in Girders and Similar Structures; with Observations on the Application of Theory to Practice, and Tables of the Strength and other Properties of Materials. By B. B. Stoney, M.I.C.E., and Engineer to the Dublin Port and Docks Board. Vol. II., with numerous illustrations on wood by Oldham. London: Longmans, Green, and Co. 1869.

THE appearance of the second volume of this exceedingly useful work will (although three years have elapsed since the first was issued) be hailed with pleasure, both by the student and the advanced practitioner in the architectural and engineering professions. In the volume before us (which is double the bulk of the former, but not double its price) Mr. Stoney continues the discussion of the more abstruse branches of his subject with praiseworthy perspicuousness. He gives tables, exhibiting the crushing strength of the various descriptions of cast-iron, of timber, stone, brick, cement, glass, &c., &c. We make room for one of those, with Mr. Stoney's prefatory observations (p. 215):—

"The following table contains the crushing strength of stone and brick. The working load on brick-work, concrete, and rubble masonry, rarely exceeds $\frac{1}{6}$ th of the crushing weight of the aggregate mass. Cut stone, like the voussoirs of an arch, or in pillars, should not be subjected to more than $\frac{1}{20}$ th of the crushing weight of the stone. Practically this limit is seldom reached":—

Description of Stone.	Specific Gravity.	Crushing Weight in lbs per sq. in.
GRANITES.		
Aberdeen, black kind	2.625	310914
Peterhead, hard close grained .. .. .	.. .. .	8282
Cornish	2.662	6356
Killiney, near Dublin, very felspathic .. .. .	.. .. .	10780
Kingstown, do. grey colour .. .. .	.. .. .	10115
Blessington, Co. Wicklow, coarse and loosely aggregated .. .. .	.. .. .	3630
Newry, slightly syenitic .. .. .	.. .. .	15440
Mount Sion granite	2.675	12361
SANDSTONES AND GRITS.		
Arbroath pavement .. .. .	.. .. .	7884
Caithness do .. .. .	.. .. .	6493
Dundee sandstone or Breckia	2.550	6030
Craigleith white freestone	2.452	5487
Bramley Fall, near Leeds (with and against strata)	2.506	6059
Derby Grit, a red friable sandstone	2.316	3142
Ditto, from another quarry	2.428	4345
Yorkshire paving (with and against strata)	2.507	5714
Red sandstone, Runcorn (17 feet per ton) .. .. .	.. .. .	2185
Quartz rock, Holyhead (across lamination) .. .. .	.. .. .	25500
Ditto (parallel to lamination) .. .. .	.. .. .	14000
COBBLITES.		
Portland stone	2.423	3729
Ditto, another specimen	2.428	4570
MARBLES.		
Marble, statuary .. .. .	.. .. .	8216
Ditto, white statuary, not veined	2.760	6058
Ditto, white Italian, veined	2.726	9681
Ditto, black Arabian	2.697	9219
Ditto, Devonshire red, variegated .. .. .	.. .. .	7428
LIMESTONES.		
Limestone, compact	2.584	7713
Ditto, black compact, Limerick	2.598	8855
Ditto, Purbeck	2.599	9160
Ditto, Anglesa (13 cubic feet per ton) .. .. .	.. .. .	7579
Ditto, Kerry, Listowel quarry .. .. .	.. .. .	15043
Ditto, King's County, Ballyduff quarry, near Tullamore .. .. .	.. .. .	11340
Ditto, Kildare, near Athy .. .. .	.. .. .	14350
Ditto, Dublin, Finglas quarry .. .. .	.. .. .	16940
Chalk .. .. .	.. .. .	501
SLATES.		
Valentia, Kerry .. .. .	.. .. .	10943
Killaloe, Tipperary .. .. .	.. .. .	20860
Wicklow, Glanmore .. .. .	.. .. .	16170
BASALTS.		
Whinstone, Scotch .. .. .	.. .. .	8270
Greenstone, from Giant's Causeway .. .. .	.. .. .	17220
Grauwacke, from Penryn-mawr	2.748	16393
BRICKS.		
Pale red	2.085	562
Red brick	2.163	808
Yellow face baked Hammersmith paviors .. .. .	.. .. .	1002
Yellow-faced burnt Hammersmith paviors .. .. .	.. .. .	1441
Fire-brick (Stonbridge) .. .. .	.. .. .	1717
Brickwork set in cement (bricks not of a hard description) .. .. .	.. .. .	621

Under the head of "Temperature" (p. 305) the author gives us its effect on iron and stone arches:—

"Changes of temperature affect bridges very differently, according to their mode of construction. An increase of temperature causes the crowns of iron arches which are confined between fixed abutments to rise, and the spandrels to extend lengthways, chiefly along their upper flanges; hence, room for

longitudinal expansion should be provided by leaving a vertical space between the masonry of the abutments above springing level and the ends of the arch spandrels. When iron arches extend over two or more spans, their spandrels should not be rigidly connected together like continuous girders; for then their expansion may cause a dangerous crushing strain along the line of junction and throughout the top flanges, a portion of which strain will, no doubt, be transmitted to the arches themselves. When, therefore, it is considered desirable to connect together the spandrels of consecutive arches, it should be effected by sliding covers or some similar contrivance, which, while restraining lateral motion, will allow perfect freedom for changes of length. The rise in the crown of one of the cast-iron arches of Southwark bridge for a change of temperature of 50° F. was observed by Mr. Rennie to be about 1.25 inch; the length of the chord of the extrados is 246 ft., and its versed sine 23 ft. 1 in., and accordingly the length of the arch, which is segmental, is 3020 8 in.*

"Stone arches are affected in the same way as iron arches. With increased temperature the crown rises and joints in the parapets over the crown open, while others over the springing close up. The reverse takes place in cold weather; the crown descends, joints over the springing open and those over the crown close. When stone or iron arches are of large span their movements from changes of temperature will generally dislocate to a slight degree the flagging and pavement of the roadway above.

"An increase of temperature causes suspension bridges to deflect, just the reverse of what happens to arches; girders, which exert only a vertical pressure on the points of support, extend longitudinally under the same influence, and on this account it is usual to provide rollers, or, if the span be moderate, sliding metallic surfaces, under one end of each girder. It may be questioned, however, whether sliding surfaces long remain in order, and some engineers prefer timber or stone wall-plates beneath the ends of the girder, even when the span exceeds 100 ft. In place of being supported by rollers, girders are sometimes hung from suspension links, the pendulous motion of the links affording the requisite horizontal movement due to change of temperature. The chains of suspension bridges are generally attached to saddles which rest on rollers on top of the towers; the object of these, however, is rather to compensate for unequal loading than for changes of temperature."

In the appendix we find a general description of the Boyne Lattice Tubular Bridge, accompanied with experiments made during the progress of the work to test the working strains, &c. The total weight of wrought iron used in the construction of the bridge was 739 tons, and about 18 tons of cast iron.

"The Boyne Viaduct carries the Dublin and Belfast Junction Railway across the valley of the River Boyne near Drogheda, and consists of several lofty semi-circular stone arches on the land, and a wrought-iron lattice tubular bridge in three spans over the water, the surface of which is about 90 ft. below the girders, so that vessels of considerable tonnage can sail beneath. The girder-work is formed of two lattice tubular main-girders, having their top flanges connected by cross-bracing and the lower flanges connected by cross-bracing and road-girders, so as collectively to form a tubular bridge for a double line of railway. Each main-girder is a continuous girder, 3 ft. wide and 550 ft. 4 in. long, in three spans. The centre span is 267 ft. from centre to centre of bearings, and 264 ft. long between bearings. Each side span is 140 ft. 11 in. long from centre to centre of bearings, and 138 ft. 8 in. long between bearings. The flanges are horizontal, and the depth of girder, measured from root to root of angle-irons, is 22 ft. 3 in., or $\frac{1}{12}$ th of the centre span and $\frac{1}{51.37}$ of a side span. Each of the terminal pillars is 18 in. broad in elevation, and has a bearing surface of 4.5 square feet; each of the pillars at the ends of the centre span is 3 ft. broad in elevation, and has a bearing surface of 9 square feet. The road-girders are 7 ft. 5 in. apart from centre to centre, and correspond with the inter-sections of the lattice bars, which are placed at an angle of 45°, and form squares of 5 ft. 3 in. on the side."

With this volume, as with the first, are given a number of well-executed diagrams on wood by Oldham. They are shewn with white lines on a black ground, and are highly effective, particularly two fold-up plates exhibiting sections of the Boyne Viaduct. The work is from the press of Mr. John Falconer, Upper Sackville-street, and is very creditably exe-

cuted. As a book of reference, it should be in the library of every member of the profession.

Cassell's Household Guide.—The first part of this (which promises to be a really useful) work, is to hand. Papers on every imaginable subject are announced for appearance in its pages. Even the architectural domain will be intruded on. In the introduction we are told that "For those who are about to build, there will be papers on the best way of planning a house, and the best materials to be employed in its construction; while those who are already occupying houses which they are unable or unwilling to leave, will find advice as to the best plan for remedying or removing existing defects which are making their houses unhealthy or uncomfortable." With this part is given a colored frontispiece shewing eight dishes of fish, flesh, and fowl, prepared for table. There are, besides, some hundreds of woodcut illustrations.

DROGHEDA—ITS GUARDIANS AND COMMISSIONERS.

In last Saturday's issue of the local *Conservative*, attention is drawn to the alarming increase in the number of cases of fever and scarlatina in the town and neighbourhood. It is to be hoped that the parties responsible for the cleanliness and health of the town will at once enforce such sanitary measures as by Act of Parliament they are empowered. We quote the remarks of our contemporary:—

"The *Lancet* states that, in consequence of a fatal case of scarlatina having occurred in the Clerkenwell workhouse, the guardians, through fear of taking the disease, have decamped, and now hold their meetings at another workhouse. Those English guardians of the poor must be very timid, or our Irish ones very rash. Our readers would stare if they read such an announcement as this:—'Twenty-seven fever and scarlatina cases having been treated in one week in the hospital of the Drogheda Workhouse, and two officers of the board having been seized, one with fever and the other with scarlatina, the guardians, through fear of infection, have refused to assemble in the board room, and now hold their meetings in the Whitworth Hall.' If the guardians were not so accustomed to sickness in the district as to have no fear of it, it might be in our power to make such an announcement this week. On Thursday the chairman stated there were 26 cases in the fever hospital, also that the guardians had no idea of the extent to which scarlatina and fever prevailed in the town, and particularly in St. Mary's parish. The weekly return showed an excess of 11 cases over the number for the corresponding period of last year. It must be remembered, too, that the number treated in the workhouse hospital does not represent anything like the total of fever patients in the town. Very many are treated in their own dwellings by the dispensary medical officers, while others, members of trade societies, have their society doctors to attend them. If the medical gentlemen residing in Drogheda would consent to publish a weekly return of the cases, entirely apart from their private professional practice, which come under their notice from Saturday to Saturday, we would receive a very alarming idea of the ravages disease is making in and around the town. One result would probably be that the Town Commissioners would be mobbed in the streets, and forced for their own bodily safety to do something towards checking the death-rate. At Thursday's meeting the guardians adopted a letter to the Town Commissioners, calling upon them to put the cleansing provisions of the Act in force. On the first Monday of next month, most likely, the letter will be read, and a few meaningless and unpractical remarks made thereon, and nothing—that endless "nothing"—be done. The guardians ought to know that it is useless to ask these Commissioners to do anything for the public advantage, and that, even if they had the "will and inclination," which Mr. P. Mathews gives them credit for, their officers are entirely unprovided with either desire or ability to carry out their commands. The *Lancet* remarks that the only effectual remedy for the condition of such workhouses as Clerkenwell would be to make the guardians take the place of the inmates for a week. If the Town Commissioners of Drogheda were served in a similar manner, and if in the interval between their last and next meeting one-third of their number were smitten with scarlatina, and another third with fever, it is just possible that the remaining eight would begin, awkwardly enough owing to want of practice, to put the Act of Parliament in force."

THE ANCIENT CEMETERY OF ST. FINN BARRE'S, CORK.

THE Cork Cuvierian and Archæological Society held its second sessional meeting on the 3rd inst. Doctor Caulfield exhibited a section of an excavation made when laying the foundation of the north-east pier in the new Cathedral of St. Finn Barre. About this spot the limestone dipped, so that it was found necessary to dig down to the depth of about 30 ft. to get at the surface of the rock. At this depth an ancient burial-place presented itself, containing human remains for about 6 ft., over which was a stratum of decayed vegetable matter, mixed with earth and small boulders, an immense boulder lying on the adjacent rock. Immediately over this was a second burial-place, about 7 ft. deep, and over it another stratum of earth mixed with fragments of old buildings, portions of decayed timber, and other vegetable debris, to a depth of about 3 ft., and over all the cemetery of more recent times. Here were evidences of the remains of three distinct places of sepulture, and exhibiting, as far as a minute examination of the remains would lead, ethnological peculiarities of a very marked type. The lower or more ancient burial-place contained numerous crania embedded in a greyish mould, mixed with a sandy deposit. No other traces of the human frame could be detected. The substance of these remains was soft like butter, and not much more than twice the thickness of an eggshell. After some care and trouble one of them was detached, which was very large. All those that presented themselves here were of the same race; in no case could the teeth or lower maxillary be discovered; but fixed in the earth in the midst of them was a thick post of oak, about 7 ft. long, having a square hole cut in the top; it had the appearance of having been part of a ship. There can be no question that this was the original cemetery of St. Finn Barre's, and may be coeval with the age of the saint. On examining the remains of the second burial ground, the crania were found to have been much smaller, and, what is very curious, whilst the crania in the lower ground still kept their original shape, those in No. 2 were contorted, and seemed to have been acted upon by pressure, not one of them retaining its original form. Here, again, the lower maxillary and teeth were wanting. Any other portions of the skeleton here found were so fragmentary as to be almost undistinguishable. The soil here was damp, which may account in some degree for the unusual appearance of the crania, which were also very solid and thick. No. 3, the upper or more modern cemetery, presented no features different from all such places. Some old red brick vaults were met with, at a depth varying from 7 to 8 ft. beneath the surface. Those may have been from two to three centuries old, and being originally placed on the superstratum of cemetery No. 2 were concealed beneath the remains of tens of thousands which, from age to age, found a resting-place here. None of the ancient sepulchres could be said to contain human remains; they were for the most part tenantless, if we except one or two, where the form of the skeleton could be traced on the floor, like a shadowy outline, faintly executed with chalk; such was all that remained of frail humanity in these dark chambers of the dead. I may remark (said Dr. Caulfield) that a silk band about 2 inches broad was found here. It is curious how the product of the silk-worm seems capable of resisting decay. I had frequent opportunities of observing this. The band, which was of a purple hue, was fastened with what is called a "true-lover's knot." It may be reasonable here to expect some account of the owners of these three distinct cemeteries, what race of people used them, and whence came they. From historical data, sufficiently satisfactory, we know that a church and a burial-place existed here for nearly twelve centuries, and that the founder was supposed to have endowed the latter with his special blessing at his death, which caused it to be one of the

most favoured and frequented burial-places in the south of Ireland. From the low level at which cemetery No. 1 existed, there can be very little doubt that it bordered on the water basin of the Lee, which at that time extended from Shandon-hill on the north to the Cathedral on the south. This was the cradle of Cork, and, being accessible by water, was the point of attack for every successive band of invaders. An examination of the early annals will materially help our enquiry. The late Dr. Todd, in his "Wars of the Gaedhil with the Gaill, or the Invasion of Ireland by the Danes and other Norsemen," gives the following particulars, which will prove the frequent inroads of the stranger, and the ravages he committed:—A.D. 821-23. "There came another fleet, &c., and they burned Corcach." 845. "Moreover Corcach was plundered by them (Danes), and they burned Ros-Ailithri (Ross) and Cenn-Mara (Kenmare) and the greater part of Mumham (Munster)." 866. "Baraid and Amlaibh's son, with the fleet of Ath-Cliaith (ford of huddles). And they left not a cave there under ground that they did not explore, and they left nothing from Luimnech (Limerick) to Corcach that they did not ravage." 916. "Afterwards came innumerable hordes under Ragnall, grandson of Imar, &c., and they separated into three parts, one-third settled at Corcach." Here we have a foreign migration, a totally distinct race, which, amalgamating with the remnants of former conquests, may have completely altered the character and type of the native people. The concluding notices are from the "Annals of the Four Masters." 946. "A hosting was made by Olchobhar to demolish the fort of Corcach," that is, says Dr. O'Donovan, "the Danish Fortress of Cork." 960. "The fleet of the Ladgmans came to Ireland, &c., and robbed Lis-more and Corcach." 967. "An army led by Mathghamhain, &c., remained three nights at Corcach, and carried off the hostages of Desmond." 1012. "A great fleet of foreigners arrived, so that they burned Corcach." From these authentic sources it will appear how often Cork had in ancient times been subject to invasion from foreign parts, and how intermixed with strangers must have been the inhabitants of this city. How little reason have we then to feel surprised at the ethnological varieties that exhibit themselves amongst the mouldering ashes of the Northern Sea rovers and those of the aboriginal Irish Celt now mingled in peace.

Mr. Robert Day, jun., F.S.A., through the courtesy of the Rev. J. A. Grant, was enabled to exhibit a stone shaft or pillar-shaped object, terminating at both ends in well-formed circular bowl-shaped vessels, one being larger than the other; also a stone ball, both of which were found in a peat bog, on the property of Mr. Carey, of Carey's-ville, at Ballylacken, on the Blackwater. The large cup measured 5½ in. in diameter, and 17 in. in circumference, and encircling the shaft beneath the swell of both cups, the often recurring chevron or dogtooth ornament can be traced. It measures 10½ in. in extreme length. The ball fits exactly into the cup at the smaller extremity, and although made of a different kind of stone from the cup, one was clearly intended to fit into the other. What they could have been used for is so far a puzzle. It was suggested they might have been part of some game resembling that of cup and ball; and also that the cups might have been simply oil lamps; or that the ball acted as a grinding stone, and served for triturating corn, which the cup would have contained. A similar pillar-shaped vessel, with a cup only at one end, was found in a rath in this county some years ago, and is in Mr. Day's collection. It is, therefore, more than probable that they are coeval with the rath-dwellers. Mr. Day also exhibited a bronze-looped socketed celt, found at Humbleton, Northumberland, and presented to him by the Rev. Canon Greenwell, of Durham. A small bronze celt somewhat similar, from France; an unusually large bronze celt of the winged Palstave variety, from Athlone; and a number of flint, arrow, and spear points

from the North of Ireland, to illustrate those from Canada, exhibited by Dr. Adams.

Mr. Hodder M. Westropp exhibited three chert cores, presented to him by Major-Gen. Twenlow. They were found 3 ft. below the rock in the bed of the River Indus, in Upper Scinde, and are remarkable for the beautiful regularity of their form, showing the facets from which the last flakes dislodged have been struck off, with the bulbs of percussion distinctly marked. Also, a specimen of the stone of the bed of the Indus, which is said to be so soft when first taken up that it may be cut like steatite. He exhibited also three chips, or flakes, and one core, from Jubbulpore. These chips, or flakes, and cores were discovered by Lieut. Swiney in the neighbourhood of Jubbulpore. Having found a few broken flakes in the bed of a small nullah, or watercourse, Lieut. Swiney followed the stream to its source, where, digging into the overlying gravel, he found a number of the more perfect of the nuclei lying near the surface of the ground; deeper than two or three feet he could find none. It is worthy of remark that not a single piece of unworked flint or jasper was to be found upon the spot, and that all that was found must have been brought a distance of two or three miles, from a range of hills on which pebbles of flint and jasper abound. Some few of the chipped flints were found in the bed of the Nerbudda river, and in the red soil of the hills in the neighbourhood. All the specimens are made, not of flint, as in other countries, but of the finer kinds of silicious rocks, such as chalcedony, agate, cornelian, and jasper of various colours. None of the cores exceed 2 in. in length; more commonly they are from an inch to an inch and a quarter long. Several of them still show (as in the specimen exhibited) a portion of the original surface of the pebbles from which they have been formed, having the facets left where the flakes have been struck off only on one of the sides.

THE PUBLIC BENEFIT OF STATE TELEGRAPHS.

A VERY interesting article appeared in the *Pall Mall Gazette* of October 20th on the subject of telegraphic communication in connection with the Act by which the whole of the telegraphs of this country will shortly pass into the hands of the State. The writer has treated the whole matter so exhaustively and clearly that any attempt to enlarge upon the subject must result in plagiarism. Still, without wishing to add anything to the facts so clearly stated, there are one or two points that will bear a little more elucidation, if only for the purpose of bringing more home to the public the very great extent to which their interests are concerned in matters that might at first sight appear unimportant. The writer of the article, after glancing at the objects of this appropriation of the telegraphs by the State, which are ostensibly to extend and facilitate telegraphic communication, proceeds to explain in a most lucid manner a system of communication carried on by means of numerical symbols, which method is no novelty to military men, as it is the one in use throughout the army generally.

The very great advantages derivable from the use of this system are so obvious that to enumerate a few of the principal ones will be sufficient. The first is, the greater rapidity with which messages can be transmitted; and we must recollect that rapidity means that one wire will do the work for which two are now required, and also the reduction of apparatus and working staff, and these economies combined, mean that the public will be enabled to make use of the telegraph at a cheaper rate.

For instance, experiments conducted on board the *Great Eastern* in 1865 gave the following results, in presence of the most eminent English and American electricians of the day:—

Three identical messages being transmitted through the whole length of the Atlantic cable by means of the Bolton or Army code, and also by the present known as the Morse

system, the time required for their transmission and the number of symbols used was as follows:—

No. of groups of figures. Bolton Code.	No. of letters. Morse system.	Time by Code. min. sec.	Time by Morse. min. sec.
56	611	27.45	71.30

In other words, the Morse system required about three times the number of symbols and nearly thrice the time requisite for the transmission of the same messages by the Bolton code.

Another great advantage in favour of the latter is, that those using it can ensure perfect secrecy for their despatches, by using what may be termed a telegraphic dictionary, which is singularly simple, and has been compiled with great care by its inventor. A translation of this dictionary adapts it to every written language, and a message may therefore be sent in one language and received in another, or in the same at pleasure. All purposes also hitherto fulfilled by writing in cypher can be accomplished without entailing additional trouble on the clerks, correspondents agreeing beforehand to read fours as sevens, sixes as nines, and so on.

It would be superfluous to dilate further upon these advantages, which must be at once apparent to commercial men, correspondents of the press, and all who habitually make use of the telegraph.

The only unsatisfactory portion of the article in the *Pall Mall Gazette* is that in which the writer seems to question the disposition of the Government to concede those advantages to the public which they are manifestly entitled to demand under the new system.

All that is required being that figures should be charged for as letters, this would admit of the public using that method which they might prefer, and it is not credible that Government will ever pursue the narrow and illiberal policy of making the use of a cumbersome and expensive means of telegraphy imperative, instead of permitting that of a more rapid and consequently cheaper one which is actually in existence, and the employment of which has been for some time adopted in one, viz., the military department of the State.—*Broad Arrow.*

CORRESPONDENCE.

[It is to be distinctly understood that although we give place to letters of correspondents, we do not subscribe editorially to the opinions or statements set forth in same.]

CONCRETE BUILDING AT RUNNAMOAT.

TO THE EDITOR OF THE IRISH BUILDER.

SIR,—A copy of your issue of the 15th ult., giving an account of the concrete building going on here, was sent to me, and in it I see you express a wish to know if it has proved satisfactory.

I have much pleasure in complying with your request. There is no point in which it does not exceed my most sanguine expectations. It is run up easily and quickly, is as hard and strong as granite, and the boys and men employed mix the concrete, pour it into the frames, and build away, with scarcely any supervision.

Whilst Mr. Tall's manager was here we got on as quickly as we could conveniently, being anxious to get as much benefit from his suggestions as possible.

The building was 80 ft. by 22 ft. and 18 ft. high to gutters, two storeys, and three partition walls. We ran it up all round at the rate of 18 inches a day. I am far from saying we could not have done more. One small piece of the building went up 3 ft. in the morning, and 3 ft. more in the evening, but in this piece we put a little more cement through the gravel. After Mr. Broughton left we took things easy, as the carpenters were unable to get things ready; however, having put the first bucket of stuff into the frames on the evening of the 7th September, we put the last slate in its place on the 26th of October—a rate of speed with which I and my builder, Mr. M'Owen, were quite satisfied.

We are now engaged on other buildings, some of which contain several very awkward angles.

Wise people shake their heads, and say "it is all very well till frost comes," but there is no moisture in the walls for frost to take hold of; rain runs off it as off a duck's back.

Our mode of putting in the joists (9 in. by 3 in. and 21 ft. long) is somewhat curious from its simplicity. Two men approach bearing the joist between them; they walk up a plank resting on a trestle; they then slide the joist through the hole in the outer wall left for that purpose: when the joist is about balanced, one of the men goes inside and carries its end on a pitchfork, his comrade keeping it pushed on, and with the pitchfork it is quietly placed in the niche left for it in the inner wall, the same operation being continued until all are laid.

I perceive that you give an extract from the *Builder*, saying "the greatest care must be used in choosing the material;" we don't give ourselves much trouble here. My screener digs up the gravel at the pit, passes it through a half-inch screen, and sends what goes through, and anything that does not, being no larger than a walnut, over to the building, it is then remixed in such proportions as we deem advisable.

I think the writer is correct in stating that anything finer than the cement will kill it, but it is difficult to get anything so fine. If concrete building comes into general use in Ireland we shall make use of crushed limestone—perhaps the best possible material. The appearance of the finished building is very pleasant—a drab colour—which has the merit of looking cool when everything else is hot, and warm when everything else looks cold.

C. RALEIGH CHICHESTER.
P.S.—Local calculations are of not much general use, but I think my saving, as compared with rubble masonry, will exceed 30 per cent.

IMPORTATIONS.

TO THE EDITOR OF THE IRISH BUILDER.

SIR,—Knowing the deep interest you take in the advocacy of Irish industry, I venture to draw attention to a suicidal policy that appears to be increasing every day, viz., the importation of foreign manufactures. I know many honest and patriotic Irishmen who, through ignorance of the fundamental principles of nationality, appear before the world in anomalous positions. Whilst they denounce the evils of *absenteeism* in landlords, and other grievances under which we labour, they unwittingly augment what they profess to condemn. Last year, while travelling in a remote part of Ireland, my attention was attracted to the great number of parcels with which the post-car was laden. I need not tell you that I was greatly surprised upon perceiving that they came from England, as denoted by the labels of a "London tailor," a "London stationer," and a "London shoemaker." There was also a parcel directed to a Catholic divine, "to be kept dry," and which I have been informed was also from London. The tailor's and shoemaker's parcels were directed to a well-known Irish patriot, and the stationer's to a gentleman who differed with the latter on nationality, but agreed with him in not practising it. Is it not deplorable to contemplate these three representative Irishmen ruthlessly driving their own countrymen to seek employment in other countries merely to satisfy a foolish and unpardonable vanity by having their names booked in London houses, and their parcels arriving from the great metropolis? At first I did not think the country could be seriously affected by such a course—that the practice was only confined to a few thoughtless people, but now I find that it has spread to an alarming extent, and that all classes, rich and poor, have caught the mania, involving a loss to this country annually of many millions of pounds sterling. I fear if some effort will not soon be made to check importation, several trades in Ireland will become extinct, and the unfortunate craftsmen forced to emigrate. I was in a

certain provincial town some time ago, and on visiting a Catholic cathedral I was informed that the organ had been built in London. My informant was much surprised when I told him that the organ in Christ Church Cathedral, Dublin, was built in that city, and that we have facilities for building organs of any size suitable for any cathedral in the world. He could not account for his bishop (one of the greatest ornaments of the Catholic Church, and who enjoys the reputation of being a great patriot) depriving his own countrymen of employment by giving it to the stranger. It is the acts of such persons who are unintentionally forcing our countrymen into the false belief that we cannot compete, either as to price or quality of work, with other nations. On last Sunday an official attached to Marlborough-street Cathedral informed me that the clergy there were about getting a new organ built in France. In reply to my inquiry why they should send money collected from the people (£2,000) out of the country, he replied, "What can we do when we cannot get an organ in Dublin?" Like my friend in the provincial cathedral, he also expressed his surprise at the organs in Christ Church and the Castle Chapel being built in Dublin. He could not understand why Protestants were more national than Catholics, and admitted that the congregation that attend the Castle Chapel and Christ Church Cathedral were quite as good judges of music as those who frequented Marlborough street Cathedral. I could not avoid thinking of the disagreeable duty that would devolve on the organist on the arrival of the new organ from France. He will then not only have to play his countrymen out of the church, but also out of the country!

"Man's inhumanity to man makes countless thousands mourn."

AN IRISH CATHOLIC.

FROM BELFAST.

At the fortnightly meeting of the Harbour Board, a resolution was passed unanimously, to the effect that fifty acres of the reclaimed and fifty acres of the unreclaimed slob-land in the hands of the Commissioners be granted, under lease, to the Town Council, at the annual rent of £100, for the utilization of the sewage of Ballymacarrett for irrigation purposes.

The meeting of Town Council on Monday week was of a more than usually interesting character, as several important questions came before it for consideration. The Central Railway Company, (whose works are rapidly approaching completion) have made a proposal to the Improvement Committee for the execution of a work which involves in its completion one of the greatest improvements effected in Belfast for many years—namely, the clearing away of a number of old and dilapidated streets lying between Waring-street, Corporation-street, and York-street. The Central Railway Company propose in connection with their present almost completed system, to run a line from the Northern Counties Terminus, York-road, to Great George's-street, and thence through the streets intervening between that point and Waring-street. They propose that the council should be at two-thirds of the expense. This would involve the clearing away of some of the worst class of house-property in Belfast; and from the manner in which the proposition was received by the Town Council, it seems likely that the scheme, probably with some modifications, will be carried out. Another important matter was brought up in the report of the Parks Committee. It appeared that the committee agreed, subject to the sanction of the council, which was given, to purchase from Lord Donegal the Ormeau demesne, containing 173 acres, at £10 per acre rent, as a public park for that end of the town, and 57 acres adjacent to the New Borough Cemetery, Falls-road, are to be devoted to the purposes of a second park. A rate of 1d. in the pound will, it is stated, defray the expenses connected with the purchase of both, and keep them in order.

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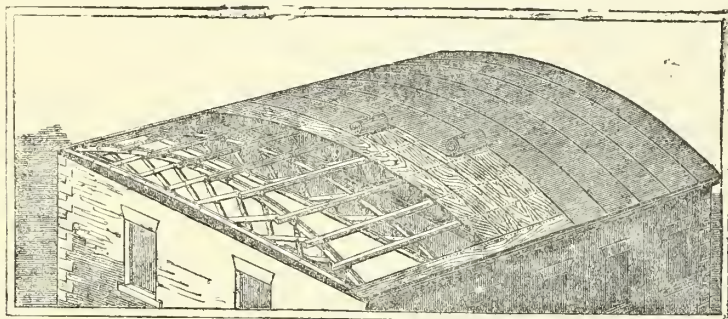
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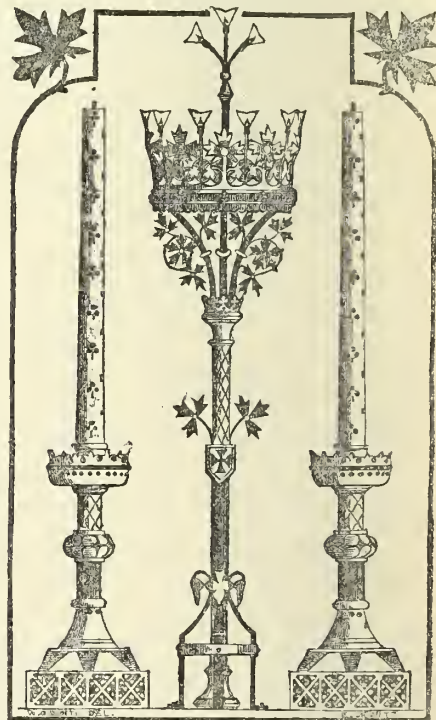
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Particular attention is being paid to the Manufacture of HIGH PRESSURE WATER FITTINGS at the FACTORY and WHOLESALE WAREHOUSE, CHANCERY-LANE.

MESSRS. EARLEY AND POWELLS beg

to announce that Messrs. John Hardman and Co., of No. 1, Upper Camden-street, have resigned the business of Artists, Sculptors, Church Painters, and Metal Workers, in their favour.

Earley and Powells have added to the above mentioned business the Painting and Staining of Windows for ecclesiastical and domestic buildings, under the management of Mr. Henry Powell, who conducted the Stained Glass Department of J. H. and Co., Birmingham for many years.

Mr. Thomas Earley is the only Church Decorator living who was taught his profession by the late A. Welby Pugin.

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CAMDEN-STREET WORKS, DUBLIN.

The Irish Builder.

VOL. XI.—No. 239

*The new Provincial Bank—its Architect,
and its Builder.*



NE of the most important building cases that ever, we believe, came before a court of Equity, was heard before the Right Honourable the Vice-Chancellor, commencing on the 16th and ending on the 25th ult., the decision being in favour of the defendants. We think we are correct in stating that the judgment pronounced by the Vice-Chancellor has given general satisfaction. The history of this *cause célèbre* will be referred to as a standard by which to test the merits of building cases—unhappily too frequent of late years. The plaintiff in the present instance was the public officer of the Provincial Bank of Ireland, and it is to be regretted that consequent on such position he has been compelled to occupy the very unenviable place which the decision of last Thursday has placed him in. One of the defendants was the eminent building contractor, by whom has been erected the palatial structure in College-street, and extending thence into Fleet-street, in which the business of the bank is now being carried on; the co-defendant was the architect to the bank, Mr. William G. Murray. The bill was filed for the purpose of setting aside three certificates given by the architect to the builder, on the ground of fraudulent collusion, excessive payments, want of authority, and neglect of duty.

The case was opened on the part of the plaintiff by the learned Attorney-General, who, in an exhaustive address which occupied the greater part of two days, sought to maintain that the measurements by which the values of the works executed were ascertained were inaccurate; that the extra work claimed and certified for, was, in fact, not executed at all; that, by the terms of the contract, it was required that all extra or additional work should be ordered as such, *in writing*, by the architect before their commencement; that the record drawings and other data preserved for the purpose of valuing the amount of extra work, were not faithful documents, and had not been prepared at the time or under the circumstances alleged in the affidavits; that the values set upon the works admitted to have been done, were excessive; and that the entire conduct of the architect and the contractor was a fraudulent conspiracy to plunder the banking firm by whom they were employed.

Mr. Palles, Q.C., proceeded with the cross-examination of Mr. William Doolin as regards the statements in his direct examination before the examiner, and, in the course of an eloquent and highly argumentative address, rebutted most clearly and conclusively the charges sought to be sustained by the Attorney-General.

Mr. William G. Murray, architect, was examined at length by Mr. Palles, Q.C.—He proved the fact that the depths stated to have been reached in seeking for a foundation were correct, and as recorded on the draw-

ing. He believed that when he furnished a contractor with a drawing from his office as a working or detail drawing, and whether signed by him or not, that it was to be taken as a written order, and that it is and was so understood. His examination went to prove generally the defendants' case; and the severest cross-examination by Sergeant Dowse and Mr. Rogers, Q.C., failed to affect his statements. He was so far complimented by the Right Hon. Vice-Chancellor, who indicated that he could not perceive any grounds for the charges made against the character of Mr. Murray.

Amongst other witnesses examined were Mr. T. O'Neill, C.E., of Cork, who was at the time the general manager and agent for Mr. Nolan. He proved having prepared the "record" plan, with all the necessary measurements subsequently marked thereon, and to having met the architect on the works, and made the actual measurements with him. This witness was remarkably clear in his evidence, and explained points of apparent difficulty in a practical business-like manner, in striking contrast to the generality of witnesses in building cases. It was very evident that he was quite familiar with his profession, and with the entire of the transactions out of which the case arose.

Mr. Nolan followed, and his examination by Mr. Rogers, Q.C., and cross-examination resulted in what might naturally be expected by those who have previously seen him in the witness-box—the thoroughly practical knowledge evinced, and the honest, manly bearing and indignant repudiation of the charges, which the necessities of the procedure in this court required to be stated against him, were most convincing. The remaining witnesses examined for the defendants were Mr. E. H. Carson and Mr. Charles Geoghegan, architects, and Mr. Arthur Dudgeon, surveyor.

The only witness called on behalf of the plaintiff was Mr. J. J. McCarthy, architect; and it is very remarkable that, with this exception, there was not one gentleman of practical knowledge or personal acquaintance with the facts of the case, examined on behalf of plaintiff.

On the conclusion of the closing address by Sergeant Dowse, in which he exerted to their utmost the powers of his master mind to prove his client's case, the Vice-Chancellor, after referring to several reported cases, proceeded to deliver judgment in a clear and able summary of the evidence and the arguments advanced on both sides. His lordship divided the case under several heads, and decided that the plaintiff had failed under each separately and *in omnibus*. He would, therefore, dismiss the bill with costs, and dissolve the injunction by which Mr. Nolan had been restrained from proceeding at law against the Provincial Bank, pending the hearing of this suit. He acquitted both Mr. Murray and Mr. Nolan of fraud and collusion, either from neglect or corrupt conspiracy.

We feel that in offering our congratulations to the defendants in this case we are adhering to our usual course by expressing our satisfaction at the triumph of right, as we believe it to be in this case, and at the same time shewing our regard for the best interests of our readers, by reminding them of the unsatisfactory relations which undoubtedly do exist in this country between the various interests connected with the professions whose *interests* we advocate.

We cannot avoid here recalling attention to the remarks which we felt bound to give

expression to on another and almost as equally important occasion—we refer to the trial of the celebrated case of Doolin *v.* Dixon:—

"We have so often and strenuously urged the necessity for some change in the relations that exist between architects, surveyors, builders, and their clients, that we trust this important case will have the effect of aiding the reform we have so repeatedly advocated, and that it will be the means of calling the attention of the builders of Ireland to the necessity that exists for some more intimate union between themselves in the matter of contracts, not only to protect their own interests, but to prevent the unseemly disputes that so frequently occur between themselves and architects, on account of the unsatisfactory and unfair conditions attached to building contracts. We have on more than one occasion referred to the fact of the builders of Dublin having no association, or rules of any kind, to bind them to unity of action on this and other matters; and when we reflect on the importance of the subject, and the materials that exist for forming a vigorous and practical association, we cannot understand the apathy and indifference that exist on the subject."

DAMP.*

THERE is no greater discomfort in a building, for whatever purpose it may be intended, than dampness. It is a present misery and a future anxiety. The very look of a damp room—the walls and ceilings discoloured with black, brown, red, and yellow fringes flourishing on them, provoke an invincible antipathy that makes us shudder and retreat if possible, or strive and bear it—if bear it we must—with dread of coughs, colds, catarrhs, and doctors' and undertakers' bills in gloomy procession, if not in our mind certainly in that of the partner of our then sorrows (for what joys could exist in a damp house?) and to the architect it is a source of annoyance greater, perhaps, than any one other incident of his practice. No matter how skilful he may be, no matter with what judgment he may select his material, and what care he may bestow on having it put together in the best and most judicious manner, he is liable to fail in this one respect; and from that failure, to be exposed to all the unpleasant consequences likely to arise from the disappointment of his client, and to be set down by ignorant persons, or those who are jealous of his reputation, as a botcher and blunderer. It is not so long ago since I heard said of one of the most accomplished members of our profession, "Oh, he has just built a big house for So-and-so; it cost thousands, and leaks like a sieve!" The want of charity that dictates such speeches it is not our business here to combat, but it is not foreign to our meetings to endeavor to combat the ignorance on which they are founded; and the more so as we ourselves have not sufficiently grappled with the difficulty; we have not gone into the causes and origin of the disease; we have been content, after a most bungling fashion, to treat its symptoms with surface remedies, and have been, generally speaking, quite satisfied if we could hide it from view. Before I close this paper I shall enumerate some of the favorite remedies, and having first endeavoured to fix by argument and experienced facts the real causes of dampness, we shall then be in a position to judge of their probable usefulness, and when and where they may be effectively applied; and I think we shall also find, as a corollary to the proof of the theorem, that in most cases our supposed remedies are simple waste of money, and that

* Read at the Opening Meeting of the Royal Institute of the Architects of Ireland, on the 18th ult. By James H. Owen, M.A., President.

even when they are apparently efficacious, the cure has been wrought out independently of, and, in some cases, in spite of, the treatment adopted. In all matters that are subjects of experiment, we must carefully guard ourselves against presuming that an effect is due to a cause, because they follow each other in order of time. A wall may become dry after it has been cemented, but it is possible that it might have dried as soon if let alone; and to be certain that the dryness has resulted from the cementing as a cause, we must either get rid of every other possible cause of drying—which we cannot do, as we cannot isolate any wall from all atmospheric influences—or we must institute comparisons with other walls, precisely under similar circumstances of time, place, aspect, material, and construction, except that they are not cemented, and institute a comparison of the facts carefully noted, and draw our conclusion from the comparison. That is the task I now propose to myself, and to do it effectually it is desirable to begin at the beginning, by hinging together the various forms of damp—enumerating the several signs and symptoms—so as to ascertain, if possible, whether the disease is simple and uniform, and admitting of one common class of remedies, or whether there is such variety in its appearances and attendant circumstances as to justify us in believing that they arise from different causes, and to conjecture that there is necessity for different remedies. I, of course, exclude from this enquiry all dampness arising from evident mal-construction or from mere accident. The causes of these are obvious, and every one knows at once how to treat them. Mr. Briggs, in *Punch's* cartoons, sends for his builder to put on that “*loose slate*,” let us hope, for the credit of the calling, not always with the alarming results exhibited.

The first case that occurs to me is that of an external wall faced with mortar stucco, as we often see them, all mealy, and blotchy, and coming off in flakes, and we are all ready to see and say that there has been great neglect, that it wants painting, &c., and we are perfectly right, but very often we do not sufficiently consider the cause of the evil. We see the result, and are pretty sure of the right remedy; but it is of some importance to reflect on the action that has been going on, which has resulted in what we see. In all plastering there is a certainty of the exposed surface drying more rapidly than the interior, and the more perfect the workmanship, the more the surface is wetted and trowelled the more rapidly this takes place, and when it does so to any extent, it is almost certain that the surface will become cracked; it may be only with almost invisible lines, but no matter how small these cracks are, they become conduits for water. There is another action takes place in lime as soon as it is exposed to the air,—it immediately begins to absorb carbonic acid from the air, forming with it a carbonate insoluble in water (except when charged with ammonia, as the rain water of towns generally is). This outer coat, thus protected by its acquired constitution from the weather, is affected by rains only to the small extent of the solvent power of the ammonia they bear with them; but long before this has had the effect of eating through the skin, the under stratum, under the influence of the water carried to it through the innumerable cracks, however minute, has its still soluble lime washed out to a greater and still greater extent, until the front of the wall bulges and comes off in flakes, exposing

a surface underneath mealy, without consistence, and wholly disintegrated; if left alone it falls into dust, or may be rubbed away with the fingers. Anything that would have sealed up the surface would have prevented the commencement of this evil; when it has progressed to any extent, of course nothing will avail but complete removal of all the finished plaster. A simple washing with a lather of soft soap has been sometimes found effectual in preserving the surface and preventing water from penetrating—I presume on the same principle as we observe in operation when using ordinary soda soap in hard water, the surface of which becomes covered with a coagulum of lime soap, from a greater affinity of the lime for the fat than the soda.

It follows, as a natural corollary, that for external plastering it is desirable that the wall should be well dried before it is applied, and that the coating cannot be too thin, consistently with preserving an even surface,—of course when I speak of a dry wall I mean dry internally,—the face of the wall to be operated on should not be too dry, as it may, if composed of absorbent materials, suck the moisture out of the mortar, and cause it to dry without adhering, as often happens to brickwork built in exceptionally dry weather if the bricks are not well wetted; and with flooring tiles also, if they are not laid when quite wet they are liable to form a cast of their under surface in the bed of cement on which they are laid and to become quite loose.

The next form of damp in walls to which I would call attention is that arising from contact with bodies containing moisture, as in the case of walls built against a bank of earth, and foundations; with the former the best treatment is always to remove the water as far as possible from contact with the wall by air drains, or by good French drains, to provide a means of conducting the moisture to the footings, or, in some circumstances, to form conduits for it through the wall;—the worst treatment, I think, is trying to seal up the inner surface of the wall or otherwise. It is very seldom satisfactory. In the other case, that of damp rising from foundations, there are different expedients adopted with which we are all familiar,—as laying a course of slates bedded in cement at the springing of the superstructure. This is uncertain, as a very slight inequality of subsidence may crack the slates and form a fissure through which water may rise. Another common remedy is to spread over the footings a coat of asphalt about an inch thick; this, however, has the inconvenience of being liable to be squeezed out by the weight of the superstructure, and should this occur, it is very likely to be pressed unequally and dislocate the courses which are nearest to it, to the great damage of the appearance of the building. In my own practice, wherever I thought a damp course to be necessary, I had the upper course of the foundations smoothed over with mortar in the usual way to prepare it for receiving the next course, but before setting the plinth I have had the top of the foundations purged over with well-boiled coal tar and sawdust,—on the principle that a film of tar, however thin, would repel any water brought in contact with it, and seal up, so to speak, the damp in the foundations themselves; but I fancy I have observed that this precautionary damp course is by some architects applied to all buildings. This is, I think, a great mistake. It is only required when the material of which the wall is built

is of an open, porous nature, such as brick, sandstone, the oolites, &c.; with such stone as the limestones of this country and the slaty rocks of the county of Cork, for instance, it is wholly unnecessary, as they are absolutely impervious to moisture, and therefore cannot possibly ruin it by capillary attraction.

But the most important, and at the same time the most common and most annoying, forms of damp are those which appear in the walls of the superstructure of houses. It is a very great mistake, but one very commonly made, to suppose that all cases of damp walls are attributable to the same cause. A little consideration of the matter will lead to the conclusion that they may be distributed into these classes, viz.:—

- 1st. Dampness belonging to the wall itself.
- 2nd. „ introduced from the outside.
- 3rd. „ arising partly from non-purity of No. 2.
- 4th. „ condensed from the inside.

As regards the first class of cases, all walls, we know, are built of mortar, and that mortar is used wet; and until the water is dried out of it the wall will continue to be damp, and that the only exit for the water of the mortar is by the two faces of the wall—the inside and outside—and a very trifling downward tendency. If the material of the wall is of a porous nature—such as brick, loose-grained granite, sandstone, oolite, &c.,—it will act as a conductor to convey the water from the heart of the wall to the surface, to be there evaporated, and consequently the wall will dry rapidly. A proof of this action is afforded by what we are all familiar with, and to which I formerly alluded, as happening when we build with bricks in very hot weather, without using them wet, that they absorb so much water from the mortar as not to leave it sufficient to attach it to the brick, which is frequently found bedded in a matrix of mortar, having no connection with it. On the other hand, if the material of the wall is of a non-porous nature, the only exit for the water is by the joints on the external faces. It follows from this, that the closer the joints the slower will be the process of drying; and that an ashlar wall will be still wet when a rubble wall of the same thickness is already dry; and also that the process of drying will depend on the thickness of the wall. A thick wall has necessarily a larger quantity of water imprisoned in it than a thin one; and having only the same means of exit, must necessarily take a longer time about it; also the hearting of a wall is the part of it where the irregular joinings of the stones are most compensated by mortar. There is more mortar in the middle 6 in. of an 18-in. wall than in either of the two outer ones; and this applies equally, if not more, to any thick walls, and is another reason why longer time is required for its operation. If such a wall has both faces exposed to the air equally, the process of drying will go on very slowly. I have known a case of a garden wall, about 10 ft. high, built of ordinary rubble masonry, to have been taken down about ten or twelve years after it was built, and the mortar in the heart of it to have been found quite wet and soft, and needing only to be tossed about and beaten up to be fit for use in the rebuilding. If, however, it is the wall of a house, the fact of one side of it being protected from the weather exercises a very important influence—the equilibrium of drying, if I may so call it, becomes disturbed, and, instead of drying equally, or nearly so, on both sides, its tendency is to drain towards the inner surface;

this is to be attributed to the average temperature inside being higher, to exemption from additions of fresh moisture from rain, to the currents of air that flow naturally through rooms which are roofed in, but without doors or sashes, and also to the fact of many of the joints on the external face becoming literally sealed up by insoluble carbonate of lime, which will be found to be very common on the southern, or nearly southern, aspects of houses, the inside face of which walls are always then most affected with damp. In such walls the most desirable course to pursue would be to rake out the mortar from the joints and body on the inside for some two or three inches as the several courses are laid, to complete the shell of the building, roof and slate it, and leave it without sashes, doors, or floors until the mortar on the inside was quite hard, and then proceed to finish the house; the delay would be amply compensated by the comfort of dry walls—as far as this one cause is concerned,—and the absence of dry rot from the timbers. But as the walls of dwellings are never left with a rough surface of, say limestone, exposed to rain, we have now to consider what is the effect of the usual modes of internal finishing. From what has been stated it will be seen at once that if the inside of a wall is lined with a non-absorbing surface, the evaporation on the surface becomes checked, and the wall must dry on its outer surface only; but there is scarcely any surface-material which we can apply which is not more or less absorbent, and which does not, by sucking the water out of the heart of the wall and bringing it to the surface, keep that surface damp as long as the heart of the wall retains any moisture. The ordinary coating of plaster, cement to a very great extent, brick-lining—all these act as sponges to suck the moisture from the heart of the wall, and bring it to the surface, to be there evaporated; and, of course, during the process of drying, the internal surface is damp; reverse the process of coating, line the walls outside with the absorbent material, and the process of drying is diverted to the outside, the evaporating surface is enlarged from the small area occupied by the joints and beds to the whole area of the wall, and it dries very rapidly indeed. The practical deduction from the consideration of this first case is, that time is necessary for drying all walls, but this is so short in the case of ordinary thin walls built of absorbent materials as that no difficulties ever arise—the walls are dry before the building can be finished; but that in the case of walls built of non-absorbent materials, the time required is very considerable, and increases largely with any increase of the thickness; and that dampness on the interior face of such walls is to be expected, and its effects guarded against.

The second case is that of damp introduced from the outside. Our most convenient course will be to consider this case first in its simplest form, viz., that of a wall, all the materials of which are porous, but which in dry weather is itself dry. If we conceive the wall to be built altogether of one substance it will simplify the consideration, and will not be so unlike reality as to cause any material error, because, in fact, brick and dry mortar are similar in the respect that is alone of importance in this case, that both are porous and absorbent, although in different degrees—that difference we may safely neglect until we come to apply to practice the results of our investigation. Let us sup-

pose that we have a bar of terra-cotta unglazed of some 18 in. or 2 ft. long, and that we plunge it in water to the depth of an inch or two, we shall see the water travel along the bar, conducted by its pores, and we should find that it would continue to travel along it until it reached a point where it could not be got to go any further—where dampness had ceased and dryness commenced;—that point would vary with the temperature and dryness of the air in which the experiment would be conducted, and would be the point at which evaporation from the surface was equal to the conducting power of the pores. It would be found also that there was a certain time occupied—that the water would travel at a definite ratio along the bar; and we have only to suppose the bar to be a brick wall, and the water supply a continuous shower, and we shall have established a damp-wall meter, and would be in a position to say a $4\frac{1}{2}$ -in. wall will stand so many minutes' rain, a 9-in. wall so many, a 14-in. wall so many—only increasing the rate of progress, or, what is the same, diminishing the time to allow for the more open mortar, or in other words, quicker conducting power of ordinary mortar. The practical deduction is, that porous walls must be proportional in their thickness to the extent and duration of the rain showers to which they are likely to be exposed, from which it follows that allowance must be made for climate, exposure, and aspect. But reverting again to the fact of the mortar being in most cases a better conductor of moisture than the brick which it is associated with, it follows that as the outer damp is being conducted through the wall the bricks in the interior are, up to the point of complete saturation, dryer than the mortar, and absorb moisture from it, thus tending both to retard the appearance of damp on the inner surface and also to equalise its effects over the surface; and this consideration becomes of very great importance when we turn to the case of, say, a limestone wall. The only possible access of damp in such a wall is through the mortar joints, and they are exposed to more complete and thorough drenching than the joints of the brick wall. Every joint that is not sealed up by the formation of carbonate of lime on its surface is completely saturated; and as the wet travels along it, the current is not diminished by any portion of it being absorbed by the other material, consequently the thickness of wall to keep out damp must be proportional to the more rapid conducting power of the mortar; and practically a stone wall, to resist damp from the outside, must be thicker in that proportion than a brick wall under the same circumstances. But as the passage of wet through a wall from the outside is due to the porosity of its component materials, it follows that if we, by any means, diminish or remove the porosity, we seal out the damp. If we take a vessel of unglazed earthenware, and put water in it, it soon appears on the outer surface; if, however, we glaze the interior, the exterior remains dry. This forms the key-note to most of the substances used for coating walls; they all form a surface more or less impervious to water, and therefore stand as a barrier between it and the wall, and many which are actually themselves porous, yet retard the action of the water; and as we have seen that time is an essential element in the case, the retardation in most instances is equivalent in practical effect to an extra thickness. There are some very interesting chemical actions take place in the case of

some of the remedies usually applied, which I should have liked to have dwelt on, but this paper bids fair to be too long already, and I have two very important cases still to investigate; it is better, therefore, to leave a more detailed consideration of the action of those remedies to a future opportunity.

The third case is when the presence of damp is attributable to the drying out of internal moisture being complicated with external moisture passing through the wall. This is the most common case, and the most embarrassing one which we have to deal with; at the same time I think that in many instances the evil is charged solely to external influence, when it is really due to the state of the wall itself, and that if that were once dry to its core, it would continue so in spite of any or all external influences. It is evident that wet from the outside must and does exercise a great retarding influence over the drying of the heart of the wall, in the same way as I have pointed out the action of the dry surfaces of the mortar joints in conveying moisture from the heart of the wall outwards towards each surface, so also will they convey rain or other external moisture into the interior, and meeting then with a mass of mortar already wet, a much larger supply of wet will be carried across to the inner face of the wall, whereas if the wall had once dried through and through, the conducting power of the mortar joints would not be sufficient to convey the water to the inner surface. New walls, when exposed to continuous rains, get their mortar joints cleaned out, and when the mortar is not wholly washed away, so much of the lime is washed out of it as to deprive it of the power of forming a consistent mass when dry; it becomes sandy and crumbling, and its power of conducting is greatly increased. The remedy for this appears to me to be the removal of all the drowned out mortar from the joints as far as possible, and refilling them with fresh mortar used as dry as it can be worked, to be forced into the joints as far as possible, and finished, avoiding all tucking, so as to let the rain flow down the surface of the wall with the least possible interruption. Spring, or early summer, and a dry season, should be selected for doing the work, when it can be so arranged; and it must not be expected that the defect will be immediately successful. The final deliverance from damp will be due to the drying the heart of the wall—that must be left to time; all that can be done is to remove anything that would retard the drying,—for the final effect, we must wait with patience. If, however, the want of thickness of the wall should be contributing to the defect, it becomes a matter of calculation of chances in each case, based on its own peculiar circumstances, whether the wall, when once thoroughly dry, will be sufficient to keep itself so; if not, it should be treated as if it were a simple case of a wall that is too thin for the exposure.

The remaining general cause of damp to be considered is that of damp condensed on the surface of walls. I have mentioned already the familiar instance of water oozing through an unglazed jar, and being retained in a glazed one; but if a few lumps of ice are put into the glazed jar, there is in a very short time an appearance of moisture on the external surface of it which goes on continuously as long as the temperature of the water, and consequently of the jar, is kept below that of the surrounding air, but which disappears after a time when the ice has melted and the temperature of the vessel has risen to that

of the air. We should find also that if we cover one side of the jar with some rather thick absorbent surface, that the side so protected will remain dry, while the other is wet. Here we have a simple example of condensation, and the mode of remedy pointed out. As this cause of damp is one that is not as much recognized and calculated on as it ought to be, it will be as well to point out some examples. One with which we are all familiar is the state of the black flags so commonly used here for kitchens, &c. These are almost always found damp and weeping, except when covered by a mat or covering of some kind, or exposed to the heat of a kitchen fire. Now these flags are completely non-absorbent, they have a smooth, hard surface, and from contact with the soil are kept at a lower temperature than the air, and therefore they condense moisture upon their surface except when their surface is protected by an absorbent material. The windows of a crowded room, even in summer, will become dewed over, and those of an almost empty one will be covered with frozen dew during frost; and in the case of very large surfaces of glass, when the difference of the two temperatures is considered, the amount of water condensed at any spot which is convenient for it to accumulate in is so great as to force on many persons, who have not considered the matter, a conviction that it must be driven in from the outside, more especially as the condensation is most active during cold driving rains, when there is a chance of the rain beating in, seems most obviously to be the cause. The most remarkable instance of condensation I ever knew was one which I saw about two years ago. The room was one which had been built probably 90 years, all its walls were of brick, and all internal, the room being in the heart of the building, and lighted by a skylight; furthermore, the walls formed a rectangle on plan, but by stud-work, plastered over, was converted into an ellipse. The walls had been painted in oil some years back, and after some damages had been repaired, holes filled in with plaster, &c., they were tinted in distemper over the oil paint. This had been done some days and had dried perfectly, when I entered the room one morning and found the whole of the walls so wet that they seemed as if the workmen had only that moment finished putting on the coating of distemper, except in the spots and patches of new plastering, where the coat of distemper was quite dry. This was in the month of January, while a rapid thaw was going on, accompanied by soft drizzling rain, after a long and unusually hard frost. This I look upon as a crucial case, it admits of no doubt. It must have been a case of condensation, as in the first place there was no possibility of leakage, and any leakage would have been local; the damp was universal, the only dry spots being those which, under ordinary circumstances, damp might have been expected from the fresh plaster, but which, having a soft absorbent surface, allowed no opportunity of condensation, which took place actively on the rest of the wall, in consequence of the extreme difference of temperature and the cold, hard surface of the oil paint. At the same time a similar thing happened to the walls of a room papered some three or four years before over oil paint for all but the last foot in height, from which an old frieze and architrave had been removed, and the surface of the plaster not painted over: three of the four walls were inside walls, precluding all theories as to leakage. Both of these are

very unusual and extreme cases, due to the great difference of temperature between the walls and the air, by the sudden change from very hard frost to rapid thaw, and occurring in a house unoccupied at the time; in ordinary cases, the general temperature of the house being kept higher than the external air, the coating of distemper or of paper would have been sufficient to prevent this occurring; or, in other words, the surface over the condensing material would have been able to absorb all the moisture and conceal it. But these instances clearly point out to us what constantly takes place in empty houses; the paper becomes saturated with condensed moisture from the coldness of the walls; this, combined with absence of ventilation or other means of drying, causes the gelatine of the paste to ferment, and a black fungus and noisome stench results; and any intending tenant or purchaser exclaims, "Oh, what a dreadful damp house!" In the case of the two rooms I have described, fires were lighted and the damp disappeared in a few hours.

I think we are now in a position to define condensation as arising when a cold, hard surface is exposed to a warmer moisture-bearing air, and consequently it will be greater or less in proportion to the coldness, hardness, and smoothness of the surface, the difference of temperature, and the dampness of the air. It follows that a surface of smoothly-trowelled cement, or stucco, will condense more freely than ordinary rendering; that of two walls of a painted staircase the outside one will condense more than the inside one.

The only remaining matter which I have to mention is the effect commonly attributed to sea salt. We all know that this salt is deliquescent, that is, possesses great avidity for moisture; and no matter how carefully it may be dried, will, if left exposed to the air, become damp spontaneously, and from this fact is derived the notion that a dry wall cannot be built with mortar made of sea sand or mixed with salt water, but both are improper conclusions—mere prejudices,—although based on an undoubted fact. The quantity of salt in either case is not sufficient to produce the effect. But then another reason which renders it desirable to avoid both the sea sand and sea water in house-building—the sand, because it is generally too fine for making good mortar; and both, because the admixture of salt renders the mortar very much denser and harder, and so promotes condensation; and furthermore, from the tendency to efflorescence, or the formation of white feathers of nitrate of lime, which is almost sure to occur, even when the proportion of salt is very small indeed.

TRAMWAYS.

THE great deficiency in the means of locomotion in our large cities is beginning to attract considerable attention. The tramways which have been laid down in Liverpool have proved an undoubted success, and the plan there adopted entirely overcomes any objection on the score of interference with the ordinary traffic. By the adoption of a small groove for the flange of the wheel to run in, too narrow to admit the wheel of even a light carriage, in preference to the old plan of rail raised above the surface of the street, the tram-plates allow of a passage across them of all kinds of traffic without any jolting. There are two extensive schemes now being matured for presentation to Parliament in the ensuing session for the City of Glasgow. It is intended in Glasgow to lay tramways in all the

omnibus routes throughout the city. The carriage to be adopted is large and commodious, and will be a far more comfortable conveyance than the time-honoured 'bus with its damp straw and the perils incident to escalating its kuife-board. The roof of the new carriage is surrounded by a light hand railing, and leaves ample space for convenient passage to and fro, without injury to the nerves of the most sensitive, or peril to the most portly or stiff-limbed passengers. In accordance with the standing orders of Parliament, notices of the intention to lay down these tramways have been posted through the various streets through which they will pass, and the municipal authorities are favorably disposed towards the measure. If the introduction of these tramways should be hailed in Scotland with satisfaction, *à fortiori* should they be welcome in all our great towns, inasmuch as the 'buses of Edinburgh and Glasgow, in all that regards accommodation, cleanliness, and punctuality, leave little to be desired. In Birmingham, there are three schemes in existence, details of which will be presented; and in Leeds, similar exertions are being made for the establishment of these new roads.—*Iron Trade Circular*.

DONEGAL GRANITES.

AT the monthly meeting of the Royal Geological Society of Ireland, Professor Haughton directed attention to the specimens of polished granite from Donegal, which then lay on the table. They were exhibited by Mr. Harte, County Surveyor of Donegal, and he (Dr. Haughton) could bear testimony to their rich lustre and brilliancy of colour,—matters of so much importance. He knew the locality where Mr. Harte got this granite, and had examined it for scientific purposes himself, and he had no hesitation whatever in saying that this fine granite would bear the most favourable comparison with that of Peterhead, commonly called Aberdeen granite; for the granite of Aberdeen itself was gray, like the Dublin granite. Why should they, then, go out of their own country to get granites when they had such fine materials as these beautiful specimens now exhibited?

Mr. Harte having been called upon to describe them, that gentleman said he felt no apology was necessary for bringing this matter before them. It was only due to that society to do so, for it was during the investigation of the scientific question affecting these granites that he had, in company with Professor Haughton and Mr. Scott, their late secretary, become acquainted with them, and since then recognized their value in a commercial point of view. The largest specimen now before them had received its polish at the marble works of Messrs. Sibthorpe, of Cork-hill, Dublin—gentlemen who had already done so much to develop the use of Irish marbles, and who, he had no doubt, would do the same as regards these granites. This granite, which he might remark was a good illustration of the practical benefit of a geological society, occupied only a small part of the area covered by the granites of Donegal, but quite sufficiently large a portion as to be practically unlimited, and had the advantage of being near a good port. The other coloured granites were more like the Peterhead granite, but quite inferior to this, but they had no granite in Scotland like this of Donegal. He had compared this granite with all the best Peterhead specimens he could get, and it was several shades higher and richer in colour than the latter—in fact it was very brilliant, and took, as they could see, a beautiful polish. He was glad to say that the matter was in a fair way to success, and he had every expectation would prove highly remunerative. He was now commencing to quarry this granite.

One of the specimens exhibited was a portion of a polished column; another was a flat piece, and a third a gray granite, with distinct crystals of pink felspar through it.

ROYAL INSTITUTE OF THE ARCHITECTS OF IRELAND.

The opening meeting of the session 1869-70 was held on Thursday evening, 18th ult., at the rooms of the Institute, 212, Great Brunswick-street, Mr. JOHN M'CURDY, V.P., in the chair.

The following recommendation papers were read:—As associates, John L. Robinson (student); W. Butler. As non-professional associate, G. Booth, clock-maker, 7, Stephen's-green, Dublin.

The honorary secretary read the annual report for session 1868-9, which was as follows, and was adopted:—

REPORT.

According to custom, the council of the Royal Institute—at the close of the year during which its affairs have been entrusted to their management—submit the following report of the proceedings and acts of the Institute during the year. They are glad to have to report a slight improvement in the attendance at the general meetings, but regret that it should not have been greater. This is in part attributable to so few papers being brought forward, if it is not rather to be looked on as arising from the same general cause, viz., the general apathy of members of the profession, which has been so often commented on by the council.

The papers read during the session were—on "Imitation," and "Labourers' Dwellings," by the honorary secretary; on the "Building Stones of Belfast and the Counties adjoining," by Mr. W. Gray, associate, which was of great practical importance; and a most interesting sketch of the history and processes of glass-staining, by Mr. T. Earley, associate.

During the session, the silver medal of the institute has been awarded to Mr. S. P. Close, associate, for his measured drawings of Holy-cross Abbey, which have since been published by him; and the bronze medal to Mr. W. Sterling, fellow, for the best series of sketches exhibited at the meetings of the Association for Architectural Study.

The council would call attention to the fact that a prize will be awarded during the present session, under the following conditions (a copy of which has been sent to each member of the institute):—

"The council offer a prize for the best contribution of sketches or notes of the present state or past history of ancient monuments, buildings, furniture, or antiquities in the neighbourhood of Dublin, or any other locality in Ireland. The council desire to encourage the study and record of such buildings, &c., as from their comparatively unknown locality, and generally conceived unimportance, are nevertheless valuable as bearing on, and illustrating, the history of ancient architecture and the practice of ancient building, ornament, and construction. A map of the county Dublin will be exhibited at the Institute rooms, on which will be marked by members the locality of any known monument. Such notes or drawings to be forwarded to the hon. secretary of the Institute before the 1st January, 1870."

During the year the number of Fellows has been increased by the promotion of Mr. Joseph Bell from the rank of Associate. Mr. Abraham Denny, of Waterford, who has retired from the active practice of the profession, has been elected an Honorary Fellow. Professor Cameron, M.D., the distinguished analytical chemist, has been elected an Hon. Member. Messrs. H. W. Thompson and T. Earley have been elected Associates; and Messrs. T. S. Sibthorpe, J. Hodges, and W. Ross have been elected in the class of non-Professional Associates.

We have to regret the loss of Sir Thomas Deane, ex-President R.H.A., both as President and Fellow of the Institute. Having ceased to practise for some years past, he claimed a right of retiring, based on age and infirmity, which the council were compelled to accord with regret at the necessity which

deprived them of an able and genial co-operator, and the Institute of the association of one of the most honored names in the profession.

There is a slight improvement in the financial affairs of the Royal Institute, which would be placed on a very satisfactory footing if the arrears of subscriptions due were paid to the treasurer.

The annual excursion proved a pleasant holiday to the members who were able to attend it. The ruins of the Seven Churches at Glendalough were visited, with Professor M'Carthy, R.H.A., fellow, as guide and historian.

Several new and ingenious pieces of mechanical contrivance have been exhibited at the evening meetings, among others the portable fire-escape of Mr. Scott, the apparatus for high-pressure water supply patented respectively by Dr. Kidd and Mr. Geoghegan, Fellow, and Mr. Millar's apometer.

A good deal of the time of the council has been taken up with questions of architectural jurisprudence;—unfortunately there have been many really *causes célèbres* recently before the courts. Without entering into the particulars of any, the council would call attention to the great importance of communicating all such cases to the Institute, in order to ensure uniformity of practice, to establish professional custom in the legal sense of the word, and to enlighten public opinion on many questions which are much misunderstood.

The treasurer submitted the following statement of receipts and expenditure, session 1868-9:—received, £135; expended, £134; balance in hands, £1; outstanding accounts, £50; subscriptions in arrear, £53 11s.

A letter was read from the secretary of council of the Royal Irish Academy, dated 14th June, 1869, on the subject of the Parliamentary grant to the academy of £200 "to be expended in affording aid to gentlemen engaged in the prosecution of scientific researches which involve outlay on instruments, &c."

The scrutineers reported that Mr. J. J. O'Callaghan (associate) had been elected a fellow of the institute.

The following are the council and officers for the ensuing session:—*President*: J. H. Owen, M.A. *Vice-Presidents*: Sir C. Lanyon, F.R.I.B.A., R.H.A. (ex-officio); P. Neville, C.E., M.R.I.A.; J. M'Curdy, T. N. Deane, F.R.I.B.A., R.H.A. *Ordinary Members of Council*: G. C. Ashlin, F.R.I.B.A.; J. R. Carroll; W. F. Caldbeck, E. H. Carson, F. V. Clarendon, B.A.; W. Gillespie, C. Geoghegan, J. E. Rogers, M.A.; A. Tate, C.E.; W. J. Welland, B.A. *Hon. Secretary*: T. Drew, A.R.H.A. *Assistant Secretary*: C. H. Brien, F.R.G.S.I. *Treasurer*: S. Symes. *Auditors*: W. Hague, jun., fellow; G. C. Henderson, associate.

Mr. James H. Owen, M.A., Fellow (the new president), read a paper on "Damp," for which he received a vote of thanks, and which we print in present number. In the discussion which followed, the chairman, Messrs. Drew, Caldbeck, Clarendon, Symes, Mulvany, O'Callaghan, Carroll, Gillespie, Stirling, Doolin, and others, took part; and the matter, for want of time, was adjourned until next meeting.

Mr. T. Drew, A.R.H.A., fellow, hon. sec., exhibited a map of the city and county of Dublin, &c., on which he had marked some places of interest for measurement, &c., for the institute prize. He also read a written description [see next column], and suggested that other members should do the same until the whole country had been thus marked out.

The president's inaugural address will be on the 16th proximo, when there will be a *conversazione* in the institute rooms, and many objects of interest to the profession will be exhibited, amongst others, specimens of the red granites of Donegal by Mr. W. Harte, C.E., F.R.G.S.I., and of the marbles in the quarries of Messrs. Sibthorpe and Son, Cork-hill.

LIST OF MEDIEVAL REMAINS AND ANTIQUITIES IN THE NEIGHBOURHOOD OF DUBLIN.

Marked thus (*) require further description.

DUBLIN CITY.—*Cathedral Church of S. Patrick*.—The choir and a great portion of the south transept presenting very fine examples of ancient Early English work, unutilized by so-called restoration (?) in 1865; stone groined roof over the latter, ancient; ancient chapel at north-west angle of nave; some stone coffins and objects of minor interest.

Cathedral Church of the Holy Trinity, or Christ Church.—North wall of nave; Early English work of great beauty and interest; transepts; remarkable remains of Transition from Romanesque; two or three arches in the choir of genuine and beautiful Romanesque work, highly enriched; a small crypt chapel used as burying-place of archbishops of Dublin; some remains of the lady chapel; brass eagle lectern, ancient and remarkably fine; fifteenth-century font; ancient effigy of Strongbow, and other objects of interest. There are many curious and valuable ancient documents and records in the possession of the dean and chapter.

Church of S. Audoen, Corn Market.—Remains of an extensive double-aisled church, chiefly of late character; west door eleventh century; ancient and very fine font, same date; south arcade of nave, thirteenth century; several Elizabethan monuments, ancient effigy, tombs, &c.; fragment of the city walls, and last existing gate of the city close adjoining.

Church of S. Werburgh.—Sculptured altar tomb and recumbent effigy built into south wall of church.

S. Michan's.—Picturesque and comparatively ancient tower.

Royal Irish Academy.—Collection of antiquities, ancient crosses, shrines, &c.; also fine collection of drawings of Irish antiquities by the late George V. Du Noyer.

S. Mary's Abbey.—Remains.*

Drinagh Castle, South Circular Road.—A fine example of ancient domestic work, still in repair and inhabited.*

DUBLIN COUNTY.—*Dunsoghly Castle, near Artane*.—Also a fine example of similar character in good preservation; small desecrated chapel adjoining.

Howth Abbey.—Extensive ruins of a church and remains of domestic buildings of late character.

Howth Castle.—Many remaining portions of the ancient castle.

Malahide Castle.—Same description.

Malahide Abbey.—Unimportant rude church in the castle demesne.

Grange, near Howth Junction.—Small chapel of some interest.

S. Douglough's.—Ancient church; eremitical cells of unique and most curious character—this is one of the most interesting antiquities near Dublin; ancient holy well or baptistery.

Swords.—Ancient castle in ruins; round tower and fifteenth-century tower of ancient church.

S. Columba's College, Rathfarnham, contains in its collection several interesting objects of antiquity; ancient furniture and metal work of interest.

Bullock and Dalkey.—Ancient castles of some interest.

Small churches of minor interest in the neighbourhood of Kingstown, Bray, and Kill of the Grange.

Tollybeg.—Ancient roadside cross.

Kilernan.—Very ancient rude church.

Rathmichael.—Ditto, and remains of concentrically incised stones of pre-Christian age.

Clontarf Church.—Remains of two rude crosses.

Bray Head.—Small rude oratory.

S. Kevin's.—Ditto, and pre-Christian incised stones in window lintel.

Killegar, near Enniskerry.—Ditto.

Stepaside.—Ancient cross.

Finglas.—Ruins of Elizabethan church.

EXCURSIONS FROM DUBLIN.—*Trim*.—A vast amount of mediæval ruins, among which are the following: King John's Castle (of great extent), the Yellow Steeple, Yellow Abbey, Parish Church, Sceneloughstown Castle.*

Kells.—Ancient crosses; St. Columb's Kitchen; ancient church. Bective Abbey—remains of abbey buildings, of Early French character.*

Drogheda.—St. Nicholas' Gate—a fine and imposing ancient gate; Magdalen Steeple; Magdalen Abbey.*

Monasterboice.—Ancient church, round tower, and famous crosses,—among the most beautiful examples existing.

Mellifont Abbey.—Remains of abbey building, including a "lavabo" and beautiful groined chapel of Early French character.

Maynooth.—Ancient castle.

Clondalkin.—Round tower.*

Kildare.—Abbey.*

Glendalough.*

Old Kildare.*

Lusk.*

PARK HOUSE, NEAR KILLEAGH, COUNTY CORK.

With this number we present our readers with a lithograph illustration of Park House, County Cork, the residence of Charles Talbot Ponsonby, Esq., as it will appear when the proposed extensive alterations and enlargements are complete. The materials to be used are those to be found on the estate,—freestone for the walling, with limestone and Youghal brick dressings; the effect sought being that of picturesque simplicity in keeping with the surrounding scenery. Messrs. H. and A. Hill, of George's-street, Cork, are the architects.

ON FURNITURE WOODS, AND INTERNAL DECORATION.

(Continued from page 77.)

MAHOGANY is extensively used in the form of veneers, for which it is one of the most suitable woods known in commerce. The best woods to be employed as grounds for veneers are, Honduras mahogany and yellow pine, although for some purposes American oak is well suited. Whatever wood is used as ground work, it should be thoroughly seasoned, and afterwards properly prepared, to prevent subsequent blistering and separation of the veneers. When the ground surface is large, the inner side of the wood of which it is composed, is that to which the veneer should be applied; and when both sides are to be veneered, as in some kinds of tables, the inner side of the ground wood should be alternated.

Furniture is frequently ornamented with wood carving, representing objects in the animal and vegetable kingdoms, the latter most frequently and suitably. But in this department there is great danger that, without adequate intelligence and taste, unsuitable objects will be introduced, or even suitable ones in an objectionable manner. Oak, walnut, and mahogany are among the woods best suited for ornamental carving; but as the characters of these woods are quite different, so, the style of ornament applied to them should vary in accordance with this difference of character.

In judging of mahogany timber for furniture, some of the chief points requiring special attention are, colour, grain, line of heart, shakes, and worm holes.

Colour.—The colour of mahogany affects its value, more, perhaps, than any other circumstance attached to it. It varies from a deep red to a pale yellow, but a mean between these is, perhaps, the most eligible. The colour is varied more or less, in some kinds, by what is called "figure"; and it is this which, by its beauty and transparency, gives value to the wood, raising it occasionally to an almost fabulous price. There are chiefly three kinds of "figure"; but these are subdivided into several varieties, with distinguishing names. They are caused by contortions and irregularities in the fibres of the wood, and the varieties of figure are caused by variations in these contortions and irregularities.

Grain.—When this is coarse, no amount of polish will make it look well, and, besides, coarse-grained wood is generally inferior both in colour and figure.

Line of Heart.—A straight cut of the saw, running through a crooked log, will necessarily vary in its distance from the centre of the tree, sometimes so much as seriously to reduce the value of the log. This depreciation is caused by several circumstances connected with the heart wood, such as unequal shrinking, liability to warp and split, and great difficulty in matching contiguous boards. These defects render the log, of course, quite unfit for almost any kind of valuable tables; but they may be in some degree mitigated by altering the "make" of the table, or by changing the mode of "opening" the log.

Shakes and Worm Holes are such obvious defects as to need very little remarks. Shakes

running with the grain do not generally injure the character of the wood as to colour or fibre; but when they cross the grain, they generally indicate unsound and brittle timber. The presence of wormholes is fatal to the use of mahogany for all superior purposes, but they do not unfit it for such purposes as veneering grounds.

In offering some observations on Furniture and Decoration, a few general principles only appear desirable, as anything like an attempt at details would, in any case, be out of place here, and in many cases would be quite impossible, unless these particular cases were given.

The furniture of an apartment, whatever may be its material, should be so selected that all its parts would have reference to each other. Nor is it less essential for the production of a pleasing effect, that the decoration of the walls should be in keeping with the furniture.

Style of architecture, aspect, seasons, uses, the house being a town or country residence, and so forth, are so many circumstances which should be taken into account, in determining the tone and style of furniture and wall decoration. A bedroom, for instance, or a library—all other circumstances being alike—should be very different affairs with an eastern and a western aspect: and almost anyone may observe, that a dining-room looking to the west is very different in its enjoyability in winter and in summer. The difference in style, both of furniture and decoration, governed by such circumstances, should be equally perceptible in drawing, dining, and all other rooms.

It would appear that a proper knowledge, and due appreciation of these principles would be a source of great economy and enjoyment, even in the humblest residences, and proportionately more so in the various gradations of mansion, up to the most splendid palace. Fashions may alter, and temporary habits vary in accordance, but the rules of correct taste may be said to be unchangeable. Therefore, when a house is once fitted up in accordance with these rules, the owner is, in great measure, completely satisfied, and scarcely any change is ever afterwards required, except what time may render necessary from "wear and tear," or from extended requirements. Not so when the house is fitted up without taste or skill. Here there is always a certain undefinable feeling of dissatisfaction, from the idea either that something is wanted which is not present, or that something which is present would be better replaced by something else. The attempt, then, to supply this desideratum by constant change, perhaps, as incompatible with true principles as the first attempt, is a perpetual source at once of useless expenditure, and of disappointment.

Whenever this correct style of decoration, so productive, at the same time, of pleasure and of economy, is once carried into effect, it would appear most desirable that there should be some means of giving it permanency. But such means are quite at command. It is true they are somewhat, and it may be sometimes considerably, more expensive, in the first instance, than the common methods, but they do not differ in their ultimate economy from all other commodities; for it is an established fact, that, where the necessary cost is available, the high-priced article, judiciously selected from respectable and competent tradesmen, is always, in the long run, the best bargain; besides that there is an indefinite amount of pleasure derivable from the respectability and fitness of things.

Painting in imitation of various woods and marbles, is a style of decoration frequently introduced into different parts of houses. Oak is very suitable for halls, staircases, or libraries, but mahogany is, on the whole, a more eligible wood, as it not only possesses greater beauty, but, from its greater variety of shades, tints, and tones, it can be more readily adapted to almost any style of colouring. As to marbles, there is a sufficient variety of colour in the natural material, to afford a practically unlimited field for the

exercise of skill and taste in harmonious arrangement. But the fact is, that the difficulty of finding artists capable of correctly imitating the exquisite beauty and endless variety of the natural material, in either wood or marble, brings this kind of painting, which is in itself a species of portrait painting, into more or less disrepute, and prevents its being adopted as extensively as it deserves; for as Tredgold has pointedly remarked, "An attempt at deception, ill managed, is always regarded with contempt." "T."

(To be continued.)

OXYGEN GAS AS A NEW MANUFACTURE—ITS USES FOR HEAT AND ILLUMINATION.*

THE chemical characters of oxygen have been so precisely fixed since its discovery, that there appears absolutely no chance of adding more to the history of our vital element. If science, however, directs at present its interest exclusively to another oxygen, the extraordinary oxygen, so improperly called "ozone," industry takes possession of ordinary oxygen—the element essential to fire, in order to effectuate the most complete combustion possible of fuel. It is truly interesting to see our chemists almost spontaneously setting to work to produce that ordinary oxygen in abundance and cheaply, which until now was only prepared in small quantities, exclusively for the requirements of laboratories, and at fabulously high prices. A practical interest was necessary for the solution of the problem of the cheap production of the oxygen, and indeed, within a short period, several solutions have been presented, which, as a remarkable fact, are all simple, ingenious, and practical.

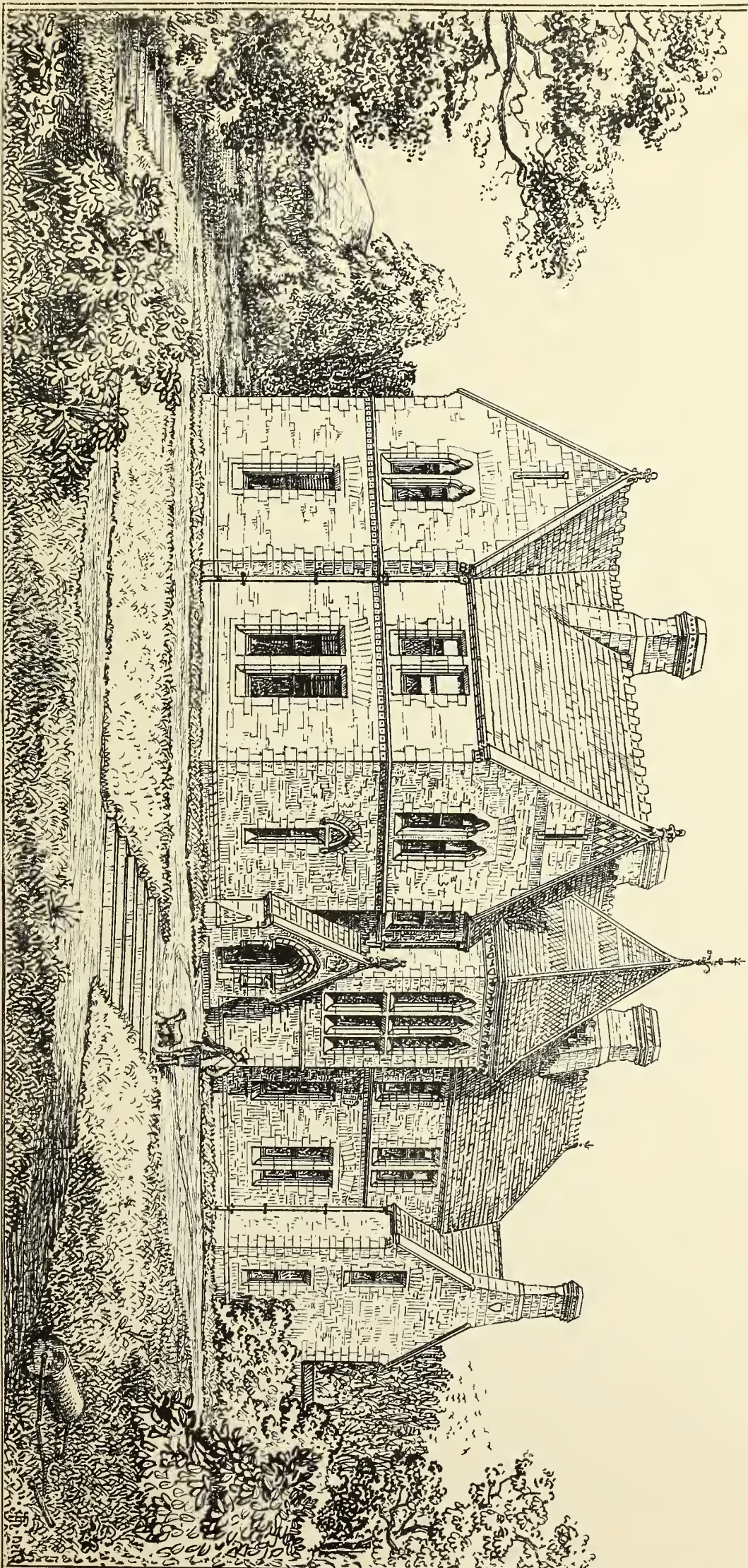
Can anybody at the present time deny the progressive influence which industry exercises over science? The very natural axiom, *Necessity is the condition for creation*, will always be applicable to the origination of every great improvement. In order to understand thoroughly the interest presented by our subject, it is advisable to consider oxygen *ab ovo*, which will permit us to rectify some mistaken ideas as to the antecedents of its scientific history.

The discovery of oxygen is generally attributed to Priestley. This celebrated chemist obtained that gas by concentrating solar light on red oxide of mercury (*precipitate per se*), by means of a powerful lens; but oxygen was known, although imperfectly, before Priestley. A learned experimenter, worthy the title of chemist, Eck de Sulzbach, showed, in the fifteenth century, that metals increase in weight after they have been heated; he calls the metallic oxides "fixed ashes" (November 1489), and says, "this increase of weight is effected by the union of a spirit with the body of the metal, and the proof of it is that artificial cinnabar (red oxide of mercury) when heated releases a spirit." If this learned chemist of olden times had called that spirit oxygen, the science of chemistry would have been in advance by two centuries. Cardan speaks, in 1501, of a spirit which feeds flame, and Césalpinus, in the year 1602, says that the dross which covers the surface of lead when melted comes from the air. At a later time, when Jean Rey calls attention to the increase of weight which tin sustains when heated in air. Finally, in 1774, we find the capital experiment of Priestley, who extracts from the so-called artificial cinnabar the gas supporting combustion which received the name of oxygen afterwards.

During many years, oxygen had not been otherwise prepared in laboratories than by the decomposition of red oxide of mercury. The use of a more common oxide, the peroxide of manganese, MnO_2 , treated either directly by heat or with the co-operation of sulphuric acid, was at once an important practical improvement; but the very great impurity of the gas thus made, and the need of a strong furnace for heating, made these methods somewhat impracticable for the la-

* From the *Practical Mechanic's Journal*.

Park House. — Designed for J. Talbot Ponsonby Esq.
HENRY HILL & A. HILL B. E. M. R. I. B. A. ARCHTS.



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boratory, and they have been advantageously replaced by the more convenient and more successful method which is there still in use, namely, the decomposition of chlorate of potash by heat.

For several years past oxygen has been prepared in experimental laboratories on a rather large scale; its consumption amounts to hundreds of litres, for the production both of high temperatures, by the blowpipe, and of that brilliant light to which Drummond has attached his name, and which seems to be destined at the present time to assume a really practical importance. It is no longer a problem to heat a few grammes of chlorate of potash in a glass retort; but, without changing the purity of the product, a method of heating has been arranged of a still more practical character. A mixture of chlorate of potash, well powdered, and of peroxide of manganese, is put into an iron bottle (such, for example, as serves for the transport in commerce of mercury); the peroxide of manganese, added in the proportion of 1:10, acts chiefly mechanically in preventing the fusion to a *fritte* of the material, for the temperature at which oxide of manganese alone is decomposed is not attained. This bottle is closed by means of a bent iron tube, into which is fitted a cork with a glass tube which communicates, by means of a caoutchouc tube, with the recipient of the gas. There is no more recourse to the old-fashioned gasometer, except in special cases, but, for all ordinary applications, air-tight bags of vulcanised caoutchouc cloth are used; the gas under pressure may be kept in these for years, provided that it has been washed before its introduction: it will be evident that it could not be so if the oxygen contained still any chlorine, even in small proportion. Operating in this manner, between one and two cubic metres of oxygen are obtained in about two hours, if the iron bottle is heated in a portable furnace with charcoal mixed with coke; it is sufficient to make the gas rapidly pass through a basin filled with water before storing it up in the bags. But now, what is the cost price? Chlorate of potash costs, on the average, 4fr. 50c. the kilogramme (in France), somewhat less, wholesale, in England; so that the price of the cubic metre of oxygen will amount to 16frs., without including the expense for heating and attendant labour, which will raise it altogether to possibly 20frs. At these prices the direct use of this agent for combustion for any manufacturing purpose is almost impossible.

M. Boussingault is the first chemist who thought of producing oxygen on a large scale, by availing himself of a very curious property which he had discovered in barytes. That oxide, the protoxide of barium, possesses the peculiarity of combining, when in its state of most absolute causticity, directly with the oxygen of the atmosphere at the temperature of obscure redness in daylight, changing into binoxide of barium; if this new oxide is now brought up to the heat of *bright redness*, it again disengages all the oxygen it previously absorbed. The barytes is placed for this operation in a porcelain tube, which is heated to the proper temperature, and into which is passed a current of damp air. As soon as the absorption of the oxygen ceases to take place, the binoxide produced is put into an earthenware retort and heated to bright redness, and so it again gives up the oxygen it had derived from the air.

The barytes thus renewed may serve for one repetition of the operation; but it is afterwards powerless: it must be revived by nitric acid, which requires a tedious and expensive operation. One kilogramme of barytes gives thus 73 litres of oxygen, or, in practice, about 15 gallons to the pound weight. If the revivification of the barytes had not been necessary, M. Boussingault would have discovered in that body a veritable chemical sponge to draw oxygen from the atmosphere. For some years, however, this ingenious combination is only referred to as part of the history of the subject. Quite lately, M. Gondolo, an engineering chemist, has been successful in modifying the method of M.

Boussingault, so as to make it fully available in practice. The barytes is mixed with mineral alkali; it is thus prevented from fritting together, and it maintains its porous character, which enables it constantly to absorb oxygen. This mixture is no longer heated in porcelain tubes, but in tubes of iron, and by means of a furnace, the temperature of which can be easily regulated, so as to produce either the low heat needed for the absorption of oxygen or the higher one, for its release. In a single half-hour several cubic metres of oxygen can be obtained, and the alternate oxidation and deoxidation of the barytes can thus be repeated even one hundred times. It is obvious that the oxygen thus obtained will cost but very little. M. Gondolo, however, collects also the nitrogen, which is a necessary educt, from the deoxygenation of the atmospheric air. He thinks that it can be profitably employed for many purposes, as for filling the air-tight cases for alimentary preserves, and for the manufacture of manures, and for the preparation of various chemical products.

MM. H. Deville and Debray indicated some years ago the possibility of reducing sulphuric acid, by heat alone, to sulphurous acid and to oxygen, by letting fall that acid drop by drop upon a plate of incandescent platina. One kilogramme of sulphuric acid will thus afford seven cubic metres of gas, at a price of one franc the cubic metre. But this method, although interesting from a scientific point of view, has not been found to succeed in practice.

The system of furnace with concentric envelopes, invented by M. Archereau, which may really be called a "*trap*" for heat, has admitted of another cheap method of making oxygen. The heat produced by the fuel is absorbed by a layer of bricks; and by an ingenious combination, like that of the regenerative furnace, it is completely restored to the chamber where reaction has to be produced. The high temperature thus procurable, and steadily sustainable for the necessary time, enables us to effectuate the known reaction of silica on sulphate of lime, which produces silicate of lime, sulphurous acid, and oxygen. This can be performed in an uninterrupted and advantageous manner. The reaction is given by the equation— $\text{SiO}_3 + \text{CaO} \cdot \text{SO}_3 = \text{CaO} \cdot \text{SiO}_3 + \text{SO}_2 + \text{O}$.

The gaseous mixture is passed into a condenser, where it is submitted to a pressure of three atmospheres; the sulphurous acid liquefies, and the released oxygen freed from it passes through a vessel of lime-water, where it is completely purified from remains of sulphur acids. It is then stored up under pressure in metallic reservoirs. The sulphurous acid might afterwards be transformed back into sulphuric acid by the usual process. The author assures us that each cubic metre of oxygen prepared by this method will cost but 50 centimes, and that the oxygen-gas will be delivered at private houses in Paris for about 1 franc 25 centimes. Here we arrive then at the pecuniary conditions at which oxygen may boldly claim to have an industrial career.

THE HANDY MAN.

A HANDY man is so practised in the regulation of the little utilities of the house he inhabits, that by a slight touch here and there, a screw turned here and a screw loosened there, and a nail driven in time, he keeps all working smoothly, and averts those domestic catastrophes and break downs, of which *Punch* makes so much capital in his pictures.

The handy man knows how to use every sort of tool that keeps his house in order. They are all neatly arranged, in his own private drawer, sacred from the meddling of children and the borrowing of the careless. Is a pane of glass shattered on a cold day, the unhandy man first stuffs it with a bundle, or pastes it over with newspaper, and then rushes to a glazier's, who of course is not at home, or who says he will come and mend it immediately, and doesn't come—meanwhile the wind blowing in gives the baby a croup, and the mother a severe cold.

The handy man, on the contrary, has his diamond, his measuring rule, his putty, all in readiness at a moment's notice, and the replacing of the pane of glass is an affair of a quarter of an hour before he goes to his office.

There springs a leak in the joint of a hot-water pipe. The handy man has his soldering tools and kettle, and it is stopped in a moment, while the unhandy man is running up-town after a plumber.

A piece of veneering starts on the side-board door. The handy man has an invisible brad of precisely the size to drive in this place—it is done in a moment. The unhandy man sees the crack widening day by day, in imbecile despair. Finally the molding falls off, and leaves a long unsightly seam.

There is one loose screw in one of the hinges of the wardrobe door—the door will not shut, the difficulty increases day by day, until the whole hinge is loose, and finally the door, hanging by its whole weight on the lower hinge, tears off altogether, with such a wreck and crash as make it necessary to send the wardrobe to the cabinet-maker, or bring the cabinet-maker to the wardrobe. What journeys and consultations of the hapless, unhandy man!

In like manner, there is a leak in the roof of the house, and every time that it rains, through this leak, in some mysterious manner, the water drops down through the ceilings of the rooms. The unhandy man is exhorted by his wife that this ought to be attended to. He promises to attend to it, and forgets it—he never thinks of it until it begins to rain, and the water begins to drop, and pails and tubs are in requisition to catch the superfluous moisture. Then, agonised and penitent, he flies to the house-carpenter, who promises to come, and forgets it likewise; and so on through successive showers and floodings, till, finally, there comes an avalanche of plastering, which ruins the carpet and furniture underneath, and makes the question of mending the roof no longer doubtful. Repairs of some 200 dols. have now to be done, on account of a leak which the handy man would have stopped in two hours.—*Hearth and Home*.

THE GREAT NEW YORK MARKET BUILDING.

A GIGANTIC market is to be built on the corner of Thirty-fourth and Thirty-fifth streets, New York. It will be a rectangular structure, eight hundred feet in length and two hundred in width, thus enclosing a market space of 160,000 square feet, the largest area of any building on the continent. Iron, Lockport stone, and Philadelphia brick are the materials to be used. There will be four grand entrances, one on each avenue, one on Thirty-fourth street, and one on Thirty-fifth street, each, of course, in the centre of the eight hundred feet sides of the building. On either side of these entrances are seven other gates for ready ingress and egress, and seventeen spacious windows to light the stalls within. There are three distinct roofs—the great central iron span of one hundred feet and seventy-five feet in height, and those of the two wings, each thirty-eight feet high. This central roof is dome-shaped, surmounted by a ventilating roof, broken at intervals by minarets. From the centre of this roof and above the south and north gates rises the grand tower to an elevation of one hundred and ninety-two feet and of the most graceful form. This tower will be constructed altogether of iron, and, at an elevation of one hundred and forty feet, will present to the cardinal points the faces of a great clock. This side elevation of the building promises to be very imposing in its immense sweep of eight hundred feet. There will also be an outer market on the river front, west of Twelfth avenue, a building with open sides, the roof supported on iron columns. This building will be one hundred feet by two hundred feet, and from its western end will project into the river a pier three hundred feet long by forty wide. The cost of the building will be 1,000,000 dollars,

ARMAGH NATURAL HISTORY SOCIETY.

We print below a portion of the address delivered at the annual meeting of the above society by the newly-elected president, the Rev. Dr. Rutledge. After thanking the members for the honor conferred on him in electing him as their president and successor to Dr. Romney Robinson (who for twenty-eight years had zealously promoted the society's best interests, and adorned it by the lustre of his fame), and pointing out the advantages to be secured to young men by a proper employment of their spare time, he continued:—

Very noble are the objects presented to the attention of young men by this society; the facts of this fair and wonderful world around us; their history; their minute inner analysis; their adaptation to time, place and circumstance; their causes, motions, mutual connections, and influence on one another; the records also of that fascinating past, of which we with our higher privileges are but the product, to which Archaeology guides us, and the materials of which are so abundant within and without this ancient City of Armagh. I refer to Archaeology, because I wish the members to bear in mind that we constitute the Natural History, Philosophical, and Archaeological Society of Armagh. Those objects are noble, I say, because the study of them elevates and ennobles the mind; brings it into closer communion with the Great Creator. It is also a *power*, for there is such relation between knowledge and the mind which knows—between knowledge in one department and that of all others, that the man who has thoroughly reasoned out and mastered any one branch of science shall have acquired a certain aptitude for mastering all others and a greater efficiency (strange as it may seem to assert it) in the performance of that particular kind of work which his daily duty requires, and a much greater capability of improving the means and instruments whereby he labours, and of thus directly benefitting himself and mankind. It is thus that all the agencies of civilization have been wrought out, and it is in this way that civilization will be still further advanced and its privileges extended. Now this society fairly provides a young man with the means of thoroughly mastering a favourite branch of science by its classes, its museum, library, conversaciones and lectures; and doubtless many can bear witness to the value of the society during those twenty-eight years of its existence under the care of its late illustrious president. Doubtless there are many friends who, looking back upon the evenings spent here, can adopt the beautiful language of Cowley, and say

"We spent them not in toys, in lust, or wine;
But search of deep philosophy,
Wit, eloquence, and poetry;
Arts which I loved: for they, my friend, were thine."

Most truly, therefore, it is to be desired that this society shall prosper. To such societies as this the discovery of many a brilliant intellect is due, which would have keenly felt the loss of the intellectual appreciation and friendly sympathy which they supplied. Time will not permit me to say more on this subject, but compels me to hurry on and address some remarks to the members here present on what I believe to be

THE CHARACTERISTIC PROGRESS OF MODERN SCIENCE.

The gradual establishment of the principle of the conservation of energy or force marks that progress. The principle affirms that as truly as there cannot be annihilation of matter, so there cannot be destruction or loss of force, and therefore that the seeming destruction of force is but in reality the conversion of it into another form of energy. Annihilation, in fact, is unknown to human experience, and seems abhorrent to the creation of God. Whatever the Almighty has been pleased to create must endure until he himself shall see fit to annihilate it, and we have

no warranty derived from either the book of nature or the book of revelation for thinking or saying that it is his purpose to annihilate one particle of matter or one solitary soul that he has created. The workman is eternal, and it seems to be his almighty will that his work shall be eternal also; but the identity of essence in the work is varied with such manifold interchange of form, ministering to both the possibility and uses of every manifestation of life, that the human intellect occasionally confounds change with destruction, and development with decay. All the forms of activity around us are but changes of one mode of energy into another, and the work of some of the greatest minds of this century has been to prove this fact and show that mechanical action, chemical action, light, heat, electricity, and magnetism are mutually convertible forces, and that any one is capable of being expressed in terms of any other. The equivalence of heat and mechanical action has been made especially plain, and the admission that heat is but a mode of action is now almost universal. Heat, indeed, can now be measured not only relatively by the thermometer, but absolutely in terms of our mechanical unit. The quantity of heat every hour from each square foot of the sun has been measured and found equal to that which would be produced by burning 15,000 lbs. of coal; or, expressed in mechanical measurement, this energy or force is equal to the work done by 7,000 horses. How enormous is the amount of energy thus thrown off into space we can partly understand by remembering the immense size of the sun, whose radius is greater than the moon from the centre of our earth, 238,830 miles. A railway train going thirty miles an hour, and never stopping, would take nearly four years to go a million miles, and eleven years to go once round the sun. Of this enormous energy, of which the sun is the source, it has been calculated that less than 2,000,000,000th part falls upon the earth's surface, and yet to that part we owe the vegetable and animal life, with which the earth abounds; the wealth of summer leaves and flowers; the beauty and utility of the clouds which drop down fatness upon the pastures of the wilderness, the gentle, balmy air of morning, noon, evening, or night; the wild sweep of the tempest, and the sublime strength of the whirlwind, which in an instant marks the earth with a ruin that a century of years will not efface. Every force in the world, indeed, from that by which we lift our own foot from the ground to that by which tons are lifted by a steam engine, is due to heat, and therefore ultimately to the sun. Now this vivifying radiation of energy from the sun includes three distinguishable classes of rays, viz.—heating rays, rays of light, and chemical rays. Upon the first—the heating rays—which, owing to the absorption of our atmosphere are unevenly distributed, depends the difference of temperature and the variety of climates found upon the earth's surface. The light-giving rays produce but little heating effect, and are in those which affect the eye and exist in great abundance in that brilliant yellow colour so intimately connected with that grand discovery of modern times, Kirchhoff's chemical composition of the solar atmosphere. The chemical rays are chiefly characterised by their power of effecting the decomposition of certain chemical substances, and are essential to vegetation, and chiefly determine the plant and animal producing power of a country. Those several rays, however, do not differ in kind, they differ only in wave, length and intensity of vibration. Their existence is ascertained by passing through a prism or solid of glass having two plane surfaces inclined to one another, a beam of white sunlight in such a manner that it enters and leaves the prism at equal angles. The solar image or prismatic spectrum will then be formed, consisting of seven colours—red, orange, yellow, green, blue, indigo, violet, of which the red will be the least and the violet the most refracted or bent from the original direction of the solar beam. Of those seven coloured spaces every

one has observed that the yellow is the most luminous; in other words it contains the maximum or greatest number of light-giving rays; and hence it was at first naturally supposed that much heat would also be found in the yellow rays, less in the red, and least of all in the violet; upon experiment, however, Dr. Herschel found that the heat increased from the violet to the red end of the spectrum, and that the mercury still continued to rise when the thermometer was placed in the dark beyond the red rays. Ultimately he arrived at the remarkable conclusion that there were invisible rays in the sun's light which had the power of producing heat, and which had a less refrangibility than the red light. This conclusion has been abundantly verified by numberless experiments, and has been stated with even greater accuracy by M. Seebeck, who has proved that the heating power of the colours of the spectrum partly depends upon the substance of which the prism is made. Hence it would seem to follow that as prisms of different substances have different powers of dispersing and bending the light-giving rays, so they have different powers of bending and dispersing the heating rays also. In the year 1801 Mr. Ritter, of Jena, discovered that the rays of the spectrum had different chemical properties which resided in the violet end of the spectrum, and existed even beyond the violet light. Muriate of silver, for example, he found, became black beyond the violet rays; a little less black in the violet, and still less in the blue; while in the yellow it was unchanged, or nearly unchanged white. As an example of the chemical actions of light I need only refer you to one of the most beautiful of modern arts—photography. About seven years later, 1808, Dr. Morichini, of Rome, found that the violet rays of the spectrum had the property of imparting magnetism, and this discovery Mr. Somerville has confirmed with respect to the blue and green rays, showing at the same time that in the yellow, orange, red and invisible heating rays no magnetic influence appears to exist. When vegetable organisms are destroyed by oxidation or burnt, carbonic acid and water are formed and heat is evolved. It is upon this heat that animals exist, which is so wondrously locked up by the great Creator in the plants upon which they feed. The plants absorb the solar radiations and store them up in order to give them forth by and by in various forms of energy, when their vegetable organism shall have been destroyed by fire. The green leaves of the plant, and the green leaves chiefly (as the photographic art distinctly proves) absorb the chemically active rays, and thus the carbonic acid of the air is decomposed into its constituent elements, carbon and oxygen; the carbon being assimilated for the nurture of the plant, and the oxygen sent back into the air for the sustenance of animal life. "My railway engines," said the eminent George Stephenson, "are driven by the sun's heat 'bottled up' in the earth for perhaps millions of years." This statement occasioned great astonishment when it was spoken, but it was but the expression of what the great Herschel had suggested, as I have shown, that as coal is but the condensed vegetable growth of former ages, every bit of coal or wood we now burn owes its condition and power of giving out heat again, to the heat which it borrowed from the sun, whether twenty years or twenty millions of years ago. So full of wonder is it, and so suggestive of high thoughts of the stupendous miracles of Him who made the world and made us also with such marvellous capacities for knowledge, reason, wisdom, to win (as a modern poet expressed it) the secret of a weed's plain heart. Thus, as I have said, the existence of those three most remarkable and practically important distinguishable classes of rays has been and can be ascertained, the heating, illuminating and chemical rays of the spectrum—showing that the differences of temperature and variety of climates are greatly dependent upon the first; human perception of the pomp and glory and infinitely varied loveliness of the colouring of the material world upon the second; and the plant and animal

producing power of a country upon the third. Now the measurement of temperature on the earth's surface, has given rise to isothermal and isothermal lines, *i.e.*, lines passing through points of equal temperature and lines passing through points of mean summer heat; but experiment has proved that the amounts of the chemical rays falling on different spots are by no means proportional to the amounts of the heat-producing rays as measured by the thermometer. It was, therefore, plainly a matter of extreme importance to devise some mode of measurement of the distribution of the chemical rays over the earth's surface which would show the curve of equal chemical intensity in order that we might thereby obtain a more accurate knowledge of the climate of any country than we could otherwise possess. This method of measurement has been happily discovered a few years since by Professor Bunsen of Heidelberg, and consists in the exact estimation of the time which a photographic paper of a constant degree of sensitiveness requires to be exposed to light in order to attain a certain given tint, experiment having proved that this same tint is always produced when the same amount of light falls upon the sensitive paper. He constructed a pendulum, vibrating about three-quarter seconds, by whose oscillation a sheet of mica is withdrawn from, and brought back over a horizontal strip of paper prepared with chloride of silver and placed in a constant position relative to the pendulum and sheet of mica. Upon the details of this method I shall not dwell at a greater length, as I believe the subject has been brought under your notice two or three years since and fully explained in his usual transparent and eloquent language by your late gifted president Rev. Dr. Robinson. It will suffice to say that by this method as well as by some other analogous since discovered, curves of daily chemical intensity have been obtained, showing the variations caused by clouds or by the changing altitude of the sun. Those curves show maxima and minima corresponding to the appearance and disappearance of the sun behind a cloud, and depict also the difference between the sun's chemical intensity in summer and winter. From those curves we can moreover ascertain the great difference existing between the total chemical action on the same day at two places separated by a known distance; and thus we have a method of ascertaining the distribution of the chemically active rays over the earth's surface, which is strictly analogous to the measurement of the distribution of the heat-giving rays by the thermometer.

I now desire to direct the attention of the society to one of the most curious and important discoveries of modern times. M. Fraunhofer of Munich discovered the existence in the solar spectrum of dark and coloured lines parallel to one another and perpendicular to the length of the spectrum. Those lines, 590 in number, are found to be fixed in position in the spectrum, and can be observed only by using prisms perfectly free from veins, and excluding all extraneous light and even stopping those rays which form the coloured spaces not under examination. The use of the telescope is also essential, and the light must enter and leave the prism at equal angles. In the year 1833 Sir David Brewster first discovered what are called the telluric or atmospheric bands of the solar spectrum, by observing that when the sun was near the horizon its prismatic image presented new dark bands. Finding that nitric acid produced the same effect in the spectrum of a luminous pencil, he concluded that our atmosphere might produce an effect similar to that and other gaseous substances, and that all the bands of the solar spectrum might be thus explained. M. Kirchhoff's researches appeared to lead to a different conclusion, and he referred the existence of those bands to an atmosphere surrounding the sun. M. Janssen, however, in a paper addressed to the Royal Academy of Sciences, first stated the truth as it lay between those opposite conclusions. Examining Sir David Brewster's lines from the Faulhorn in Switzerland, he found

that while they remained fixed in position their intensity varied, and they became fainter and fainter the higher he ascended—that is, as the solar rays had to penetrate through more rarified strata of the atmosphere. From this experiment it appeared certain that while aqueous vapour absorbs certain red and yellow rays, it is exceedingly transparent for most of these rays; because that, by what is called the law of inversion, a light that will give a bright band in the spectrum will give a dark one when it has behind it a brighter light of the same colour, which it then, instead of transmitting, absorbs. In the year 1706, Captain Stannan observing the total eclipse of the sun of that year, remarked that “his (the sun's) getting out of his eclipse was preceded by a blood-red streak of light from his left limb, which continued not longer than six or seven seconds of time; then part of the sun's disc appeared all of a sudden as bright as Venus was ever seen in the night—nay, brighter; and in that very instant gave a light and shadow to things, as the moon used to do.” This seems to have been the first mention of those wonderful and startling appendages of the sun called red flames, and which Flamsteed, to whom Captain Stannan announced them, referred to the moon, and calculated accordingly the height of the moon's atmosphere. This error lasted until 1860 (154 years), when, by means of spectroscopic observation, they were conclusively shewn to belong to the sun. We now know that the sun is surrounded by a luminous shell, called the photosphere, or light-giving sphere of the sun, and an atmosphere reaching 72,000 miles above the photosphere, because that during a total eclipse the red flames have been measured as extending from a general height of 6,000 miles, to an occasional height of 70,000 miles, like great mountains of flame rising out of a frightfully tempestuous sea of fire. During the late total solar eclipse, 7th August last, Mr. Lockyer proved that those red flames are not only gaseous, but that they are principally incandescent hydrogen. When analysed by the spectroscope the red flames give three bright lines which coincide, one absolutely with C (Fraunhofer), one nearly with F, and the third eight or nine degrees more refrangible than D. Now C and F are known to be lines given out by incandescent hydrogen, but the line near D remains to be explained by further experiments, and the explanation, doubtless, will not be long delayed, as Mr. Lockyer has discovered a means whereby the red flames can be examined while the sun is in his natural condition—that is, un eclipsed. There can now be scarcely a doubt entertained that Fraunhofer's lines in the solar spectrum are caused by the vapours of some of our metals, such as iron, and some of the secondary metals, existing in either the atmosphere or photosphere of the sun. The next question which naturally occurs to a thoughtful mind is, how is this sea of fire maintained from century to century around the sun, casting off through space that enormous amount of heat to which I have already referred? The most recent answer refers it to a constant shower of meteoric stones falling round the sun with that extreme velocity which they have derived from his attraction, when by it they have been diverted from their previous course and drawn into himself. It is calculated that if stones as heavy as granite fell all over the sun 12 feet thick in a year with the greatest possible velocity derived from the sun's attraction, 384 miles a second, the sun's heat would be maintained by the frequent strokes at its actual intensity. The zodiacal light, accordingly, which is a nebulous and faintly luminous mass not unlike the Milky Way, surrounding the sun in the form of a very flat spheroid, and reaching nearly to the earth's orbit, is supposed to be a vast collection of meteors or asteroids which are continually arrested in their course and drawn into the sun in order that by their concussion his heat may be maintained. This theory is of course beset with many difficulties, but it has at the same time very much to recommend it as a probable solution

of a most perplexing difficulty, and seems to be confirmed by the occasional flashes of light which have been observed in the sun. If it should prove to be correct, it will follow, as has been often remarked, that when the meteoric masses which now compose the zodiacal light, shall have been exhausted, the sun's heat will rapidly cool, and the sun's light will gradually disappear. If the earth should then have a living human inhabitant he may realise the sublime conception of the poet Campbell, and as he sees

“The sun's eye have a sickly glare,
The earth with age grown wan,
The skeletons of nations too,
Around the lonely man.”

A huge dark mass, the sun, with his attendant planets, and their moons, would then move in awful blackness through space, as other stars are supposed to be in motion, which, at one time conspicuous, have disappeared since men began to observe the heavens. The issue of this motion would at last be a preordained concussion between two or more of those vast bodies, which in a moment would develop such a heat as would liquefy their substance and scatter it through space for the gradual formation once more of other suns, and planets, and moons.

L A W.

VICE-CHANCELLOR'S COURT.

Hewatt v. Nolan.—The plaintiff is the public officer of the Provincial Bank, and the defendant is the builder of the new bank in College-street. The bill was filed for the purpose of setting aside three certificates of the architect, Mr. W. G. Murray, who was made a co-defendant, on the ground of collusion, excessive payments, and want of authority, &c. The three certificates in question were given for extra works, and amounted to upwards of £7,000. The bill alleged that Mr. Nolan contracted, in 1863, to build the premises for £20,350; that the bank had already paid £26,800, of which sum £7,200 was paid on account of extras; and that the amount of the three certificates which Mr. Murray had signed, made the aggregate of £35,777 as the certified cost of the works. The case involved lengthened details of measurement, &c.

His Lordship decided that the plaintiff's case had failed in *omnibus*, and he would, therefore, dismiss the bill with costs, and dissolve the injunction which had restrained Mr. Nolan from proceeding at law against the Provincial Bank, pending the hearing of this suit.

Counsel for the plaintiff—The Attorney-General, Sergeant Dowse, Mr. Rogers, Q.C., and Mr. McBlain. Solicitor—Mr. Murray. Counsel for the defendant Nolan—Mr. Pallets, Q.C.; Mr. Jackson, Q.C.; and Mr. Martin. Solicitor—Mr. Geoghegan. Counsel for the defendant Murray—Mr. Falkiner, Q.C., and Mr. Boyd. Solicitor—Mr. A. Boyd.

COURT OF COMMON PLEAS.

(Before the full court).

John Bower v. the Town and Harbour Commissioners of Sligo.—This case came before the court upon demurrer to the replication. The action was brought by plaintiff, who is an engineer, to recover from defendants the sum of £480 4s. 10d., for services rendered by plaintiff as a witness for the Commissioners in opposing certain bills in Parliament, known as “The Sligo Borough Improvement Bill,” and “The Sligo Port and Harbour Bill.” The defendants pleaded (amongst other pleas) that they were incorporated under 42 Geo. III., chap. 60, for the purposes therein mentioned and not otherwise, and were only empowered to raise moneys to be applied for the purposes of that act, and that the work for which plaintiff claimed payment was not one of the purposes for which money could be raised or applied under the Act of Parliament, and therefore the contract between the plaintiff and certain of the Commissioners was *ultra vires*, and of

no effect. The plaintiff, in his replication, alleged that the work, &c., done, was essential and necessary for the purpose of the Corporation, and the objects for which they were incorporated, because the opposition to the bills by the Corporation was essential to the defence and maintenance of the powers of the Corporation, and to that replication the defendants demurred. The Court overruled the demurrer, and held the replication sufficient.

ANCIENT IRISH ECCLESIASTICAL SEALS.

ABOUT the month of August last there was sold in Armagh the bronze matrix of a curious old seal. Although it has suffered from time's "effacing fingers," it is still capable of furnishing an impression, which shows it to be of the sharp oval form—the usual type of ecclesiastical seals so often seen by antiquaries appended to documents of the twelfth and thirteenth centuries. The device is a shield bearing a chief and lozenge lines. Above the shield is a chalice, on which a dove is resting. Dexter and sinister, a crescent and star are represented. The legend round the edge is in mediæval Latin, the letters being of the old Roman type, and reads:—

"A : S : PAVLI : ODVAINI : CAPOLLANI,"
"The Seal of Paul O'Drain Chaplain."

According to Du Cange the word chaplain in some cases means a notary, an amanuensis, a secretary, a chancellor, &c., but the word on this seal is evidently intended in its clerical sense only. There are several individuals mentioned in ancient Irish ecclesiastical history bearing the surname on the seal. The most distinguished of these was Archbishop of Munster, who died A.D. 1117. The name is subject to great variety in its orthography, and has been modernised to Dvenny, and is common in the north of the county of Tyrone. It has been correctly observed that the study of seals may, to some, appear a frivolous occupation, but the careful investigator of history will view it in a different light. By their aid we are enabled to test the accuracy of pretended deeds and charters, to detect the spurious and authenticate the genuine, and thereby ascertain historical facts which would otherwise remain doubtful or be erroneously understood. By their aid we can trace the succession of prelates, deans, and other ecclesiastical dignitaries, and thus complete the history of many ancient churches and cathedrals which would, without them, remain imperfect; and they often give pictorial representations, by which the state of the ancient ecclesiastical buildings may be traced from age to age. Seals, by their form and style of execution, are frequently in themselves authentic proofs of the condition of the arts of design at the time when they were engraved.

We have sometimes asked what has become of the long and valuable series of episcopal, capitular, and other seals, that belonged to Armagh Cathedral? It appears that a great destruction and loss of seals took place in the sixteenth century, and again during the civil wars at the period of the Commonwealth. The oldest hitherto discovered, connected with Armagh Cathedral, was found at the reere of Chapel-lane about forty years ago; it is now in the museum of the Royal Irish Academy. It is the seal of JOSEPH, who, according to Cotton's Fasti, was Dean of Armagh Cathedral from A.D. 1256 to 1272. A few episcopal seals may be seen, imperfectly engraved, in Ware's Irish Antiquities; the oldest of these is the seal of Octavian, who was Archbishop of Armagh, A.D. 1480. There are only two official seals that can lay any claim to antiquity still used by our local ecclesiastical corporations. But these are very interesting; the first is the chapter seal, and was evidently engraved at the period of the Restoration, as it bears the date 1661. The device represents a view of Armagh Cathedral, on which the tall and beautiful spire built by

Primate Hampton in 1612 is very conspicuous. We also see that a window only, and not a door, occupied the northern entrance to the old church in the seventeenth century. The other seal is the official one used by the corporation of vicars choral. It represents a western elevation of the cathedral, and is chiefly remarkable for having a fish as a weather vane on the top of the spire. This seal is not dated, but we are inclined to assign it to the year 1722, when Primate Lindsay procured the latest charter for the vicars choral, and presented them with an estate which he purchased in Co. Down at a cost of £4,000. Not very long ago the half of a large brass episcopal seal belonging to an Archbishop of Armagh was discovered among some old brass in the shop of a brass-founder in Limerick. The name of the primate was engraved on the missing half, and all of the legend that now remains is:—ARDMACHAENSIS: EPI. A very high authority in ecclesiastical antiquities is disposed to assign this seal to the celebrated Nicholas Mc'Mollissa, who was consecrated Archbishop, A.D. 1272. In the *Irish Penny Journal* are to be found descriptions of ancient seals by the late Dr. Petrie, John Corry, and others. But it would be unjust to conclude these remarks without stating that the highest authority on this class of antiquities is Richard Caulfield, LL.D., of Cork. This very learned and distinguished Irish antiquary commenced the publication, about fifteen years ago, of a serial work on Irish ecclesiastical seals, but after the appearance of some half dozen of numbers he was compelled to relinquish his intention of completing what would have been one of the most erudite and beautiful contributions ever made to our National Archaeological Literature.

THE MISSISSIPPI.

A GENTLEMAN conversant with the characteristics of this great river calculates that it moves ten thousand tons of soil one mile every hour. This is a tremendous exercise of power, and, were it not distributed over a vast area, would have the most astonishing effects in the course of a few years. For the whole of the three thousand miles of its length it is, however, continually taking up and depositing. The heavier species of dirt is carried along but a short distance, when it is again deposited in "slack water." Wherever the current in the river strikes the bank, there is an extensive excavation going on. The water laps up the loose soil, every successive wave bearing away a film on its tongues with a regular and incessant run, that leaves fearful evidences of its labour in a short time. Within a period of ten years there have been taken from the city front, by the ever rushing river, over two million tons of soil, most of which was moved miles away, equal to the combined labour of 150 men and horses during the same time, and all this was done in a space of about 700 yards of the river's bank.

When we consider that work like this is repeated at thousands of places along the banks of the river, something like a just idea of the moving done by it may be formed. Wherever a great excavation like that at Memphis is being done by the river, there will also be a sort of compensating movement going on at the opposite side of the river, that is, there is always depositing going on at the other side. We see right opposite the city that the "bars" on the Arkansas shore are making steady progress in this direction, while the river is eating away the town. This peculiar movement may be understood by considering the current of the stream as running in a series of zig-zags; away above the city the stream strikes the Arkansas shore, at which point it is scooping out with great rapidity. It rebounds from that shore at a certain angle and comes rushing along for the Chickasaw bluffs, and strikes about the mouth of Wolf River and the foot of Monroe-street. It then rebounds again, and, travelling according to the laws that regulate the motion of a billiard ball, continues on till it strikes the Arkansas shore again. At all these points

of contact there is an excavation going on, and at the points opposite there is depositing going on.

By reason of the very irregular outlines of the river's banks, of course the current observes many vagaries that are not easily accounted for at once, but a little investigation will always show the operation of well-known physical laws. This predominant feature of the Mississippi, throughout its whole length, where the banks are formed of alluvial deposits, necessitates a continual change. In many cases the change is periodical. The river having run in a certain course for a number of years, cutting and eating its way until the angle of impingement became too great, it was again decided to repair the damage it had made. Movements of that soil have been going on about here for a great number of years. Numbers of old steam boatmen recollect the time when cotton bales were lowered down to their boats from the tops of the bluffs that are now two hundred yards from the river's bank. This was about 35 years ago. The river at that time had been eating away for years just in the same manner that it is eating away now, and having exhausted its force began a different movement. It will be readily seen that a change in the course of the river, even a hundred miles above the city, would have a material effect upon its current here, so that when a change once begins it will operate upon the course of the river on down to its mouth, though the effect may not be visible immediately.

About thirty-five years ago the river began to recede from the bluff, and so continued for a quarter of a century, leaving immense deposits of earth where the channel had been over a hundred feet deep. The formation of these deposits are curious. The force of the current in the spring-time carries away an island or a sand bar; as soon as such island or sand bar is removed, the course of the river is immediately changed, and at some point below, where there was slack water, there is a rushing current, and where the current was strong there is slack water. The stream being burdened with its load of sand, begins to deposit the first slack water it comes to. In this way in a few days a great heap of sand may be raised where the force of the stream carried everything before it a few days back. Round this sandbank there will then be slack water, and the depositing of soil begins and goes on gradually until it rises above low-water mark. In this way the banks of the Mississippi filled out four hundred yards in front of Memphis in the course of a quarter of a century. About ten years ago the periodical change commenced, and the current began eating away the bank at the rate of 30 ft. a-year. Every spring whole acres of the bank fell down. The scooping-out process went on; warehouses were tumbled into the seething flood.

Opposite the foot of Market-street between three and four hundred feet were swept away. The river worked along the bank in front of the city in the shape of a crescent, beginning at the foot of Wolf River and ending about the foot of Monroe-street, below which point there is now a depositing going on. The excavation is going on with unabated vigour, and no one can tell where it will stop. This time it may eat its way beyond the bluffs and threaten the foundation of the city. The sandbank on which the soil is deposited is said to be 70 ft. thick; the soil above it is 20 ft. or 25 ft. This sand is going away with fearful rapidity; and when the river has made a deep cave underneath the superincumbent mass, the soil falls in of course.

The question which exercises the ingenuity of engineers and rouses the fears of the citizens, "Is it possible to stop the encroachment of the river before irreparable damage is done?" There is no lack of suggestions from every source. The great danger is to be apprehended from a permanent change in the course of the river above us, in that we may be left high and dry a mile away from a steamboat, with series of shallows and sand-bars in front of us that would effectually destroy our landing facilities.

NOTES OF WORKS.

The new church of St. Paul, Gilford, Co. Down, has been consecrated by the Lord Bishop of Down and Connor and Dromore. It has been built at a cost of £1,000. J. W. M-Master, Esq., Dunbarton House, Gilford, granted a site and contributed £1,000; and, in addition, provided a parsonage-house, and an endowment of £40 a-year. The district attached to the church has been taken off the parish of Tullylish. It consists of the townlands of Loughans (including the town of Gilford), Moyellan, Mullahack, and parts of Drummiller, Drumaren, and Ballymacanallen. The church will afford accommodation for about 600 worshippers. This elegant structure consists of nave, chancel, and transepts, and a well-proportioned tower, which rises to the height of 90 ft. The dimensions are as follows:—Nave, 80 ft. by 36 ft.; chancel, 16 ft. by 22 ft.; transept, 16 ft. by 24 ft. The style is Early French, with a fine open timbered roof. The architects were Messrs. Lanyon, Lynn and Lanyon, of Belfast and Dublin; and the builder, Mr. Collen, of Portadown.

Mr. Francis Nulty has been declared contractor for building the new convent and schools at Mullingar, for the Right Rev. Dr. Nulty, Lord Bishop of Meath, according to plans furnished by Mr. W. F. Caldbeck, architect, Dublin. The cost, including boundary walls, lodge, &c., will be between £5,000 and £6,000.

MISCELLANEOUS.

In another part of our columns we (*Broad Arrow*) call attention to the establishment of a system of telegraph ships. We understand that the Government have now lent the International Mid Channel Telegraph Company, Limited, one of their ships, viz., H.M.S. *Brisk*, to be used as a station telegraph ship. Captain Barrow left London on Saturday last for Plymouth to take over charge of the ship, and make arrangements for stripping and fitting her for her new duty in the Chops of the Channel. The employment of mid-channel telegraph stations may eventually prove of great utility to the Government departments in ordering the destination of the troop-ships, and would prevent a recurrence of a piece of red-tapeism such as we have elsewhere noticed in the matter of H.M.S. *Crocodile*. Now that the Anglo-American Company have such a serious rival in the French Atlantic Company, it strikes us that if a cable were laid between Valencia and the Land's End, with connecting communications to the Channel ships, that the alliance would be beneficial to the interests of both companies. As an illustration of this, a steamer making her number to the telegraph vessel would have her arrival wired to America or elsewhere considerably in advance of a message sent after her arrival in port.

THE LATE DR. TODD'S LIBRARY.—The library of the late Rev. Dr. Todd, Senior Fellow of Trinity College, Dublin, the eminent Irish archæologist, and author of a "Life of St. Patrick," was sold by auction last week by Mr. F. Jones, D'Olier-street. It consisted of Greek, Latin, and English theology, and of books and manuscripts relating to Ireland. Amongst the most remarkable printed books were O'Reilly's Irish Writers, £12; O'Connor, Scriptores Hiberniæ, £36; Colgan's Acta Sanctorum, £22; Fleming, Collectanea Sacra, £70; Ware's Works, with large MS. additions by Dr. Todd, £450 (this work was secured for the Library, T.C.D.) Amongst the MSS., Missale Romanum, on vellum, £90; Vitæ Sanctorum Hiberniæ £11; Ulster Visitation Book of 1622, £14; General Vallancey's Green Book, £26; The Felire of Æneas the Culdee, £75; The Annals of Ulster, £50; The Irish Glossary, £20; Lincolniæ Historia Ecclesiæ Hiberniæ, £52 10s.; Historical Collection relating to T.C.D., £55; Irish Martyrologies, £50; Martyrology of Donegal, £57 10s.; The Ritual of St. Patrick's Cathedral, dated 1352, £73 10s.; Keating's History of Ireland, £26 5s.; The Book of Lismore, £43 10s.; The Book of Clonmacnoise, £31 10s. Many of these MSS. were copied for the late owner (who was a zealous labourer in the revival of Ancient Celtic literature) by the most distinguished Celtic scholars, from unique MSS. in the public libraries of England, Ireland, and Belgium.

ANOTHER GRAND HOTEL IN NEW YORK.—The formal opening has taken place of a grand caravansera, corner of Thirty-first-street and Broadway. The Grand Hotel is built of Winchester marble, in the Romanesque style of architecture. Mr. E. S. Higgins,

a successful merchant of New York, devoted 800,000 dollars to the undertaking. Each story of the eight has a distinctive architectural feature in the marble framing of the windows, one set being round, another segmentary, another semicircular, and so on. Each floor is distinguished by a colour. On this the carpets and upholstery are green, on that blue, on the next crimson, and so on through the seven primary shades. Some of the mirrors are superb; all are large and elegantly mounted. They cost 20,000 dollars. In the principal corridor of each floor, close by the broad area into which the grand double staircase opens, a coil of hose, mounted by a brass pipe, hangs suspended on a hook. 200 ft. lie on each floor, as a provision against fire. A guest may act the part of fireman, if anything like a conflagration breaks out in his neighbourhood, and he draws upon 10,000 gallons of water over his head in the reservoir top of the roof for assistance. The elevator is not without its features of novelty. At every floor you approach, the doors of wire netting, by automatic arrangement, fly open, saving the boy a great deal of trouble, and the ascending traveller a trifle of time. In the subterranean exploration—a matter of easy accomplishment, as there is an abundance of light—the laundry, the wine-cellar, the store-rooms and the water-closets come successively under observation. The gentlemen's *café*, on the first floor, is a sumptuous apartment, with heavy panelled ceiling, black walnut furniture, green drapery, and a dazzling glitter of silver ware proceeding from every table. The gentlemen's smoking-room is not yet quite finished, neither is the reading room, but both are under way to completion. A restaurant is attached to the hotel, where young men can live at a moderate rate. The whole cost of the furniture was 200,000 dollars.—*Builder*.

THE NEW BARRACKS AT GLASGOW.—The new barracks about to be erected at Glasgow will be provided with a small regimental hospital, to be constructed on the most simple, and at the same time the most modern, principles. The natural method of cross ventilation by opposite windows is supplemented by the artificial system of fresh air inlets with Nettleton's stoves, and extracting shafts. The lavatory, baths, water-closets, and sinks, are completely separated from the remainder of the building by the interposition of a lobby provided with means for its own ventilation.

IMPORTANT TO ROAD CONTRACTORS.—At the Holywood petty sessions last week, a case of some importance to road contractors came before the magistrates. Mr. Joseph Carlisle, contractor for the keeping in repair the road from Belfast to Newtownards and the road from Belfast to Holywood, was summoned by Mr. Henry Smyth, county surveyor, on a charge of having fraudulently made up on said roads certain heaps of broken stones, and presented them for measurement, with intent to fraudulently obtain a sum of money from Mr. C. A. Forde, Treasurer of the County Down. A number of witnesses proved that in the interior of several of the heaps of stones quantities of mud were found. The bench decided on sending the case for trial to the next Downpatrick Quarter Sessions.

Mr. R. Denny Urrill, M.R.I.A., in a letter to the *Athenæum*, says:—"Very recently I happened to be present at the sale by auction of a large library. An old book sold for thirteen pounds and odd shillings, amidst much surprise on the part of those present at the extent of the bidding. A well-known dealer who was present exclaimed, not *sotto voce*, but so as to be heard by all bystanders, 'There is an example of a purchase for the B—M; if I had offered that volume to them last week for fifty shillings they would not have taken it; but as the sale is a public one their agent buys it for five times the money.' For the truth of this allegation I cannot vouch, but merely narrate the matter as it occurred."

The late astounding predictions in Europe of high tides and direful earthquakes, if they have not been followed by those phenomena, have affected many countries with great anxiety, inconvenience and loss. At Singapore the prediction of the high tide chiming in with the notions of the Chinese, some £20,000 was expended in building dykes and taking other precautions. All through the republics on the west coast of South America the population fled inland, and business was for a time suspended.

CIVIL SERVICE LITERARY SOCIETY.—The opening meeting of the fourth session of this society will be held this evening in the Molesworth Hall, Molesworth-street, when the inaugural address will be delivered by the Auditor, Mr. J. M. Carlisle, A.B., Chief Secretary's office. The chair will be taken at eight o'clock by Charles Granby Burke, Esq., Master, Common Pleas, vice-president of the society, and resolution will be proposed by Sir Wm. Wilde, Dr. Waller, Wm. Gernon, Esq., M.A.; James H. Owen, Esq., M.A., F.R.I.A.I., &c. A limited number of tickets will be issued to the public at 212, Great Brunswick-street, between the hours of four and five o'clock this evening.

An address has been presented to Mr. James A. Dickinson, C.E., from the High Sheriff, nobility, and grand jurors of the County of Westmeath, on his resignation of the office of Surveyor for that county, which he had held for a period of eight years.

THE HEALTH OF DUBLIN.—According to the Registrar-General's weekly return, the number of deaths registered in the Dublin district during the week ending the 27th November was 146, being eleven less than the average number in the corresponding week of the previous five years. Of these 34 were from bronchitis and 18 from scarlatina.

THE FRIENDS OF CO-OPERATION.—We (*Grocer*) are pleased to inform our readers that Messrs. Cherry and Smalldridge, the well-known grocers' printers and paper-bag manufacturers, of Dublin, have introduced a set of tea-papers for the special use of co-operative stores. These papers and bags are "illustrated with suitable designs and remarks explanatory of the benefits to be derived from co-operation." Of course these have been produced out of a spirit of philanthropy and sympathy with the co-operative movement; and it being admitted that there is nothing selfish in co-operation, we must not blame Messrs. Cherry and Smalldridge for giving the warning that their designs are entered at Stationers' Hall, in order to prevent the carrying out of the co-operative maxim of "the greatest good for the greatest number." Messrs. Cherry and Smalldridge, who call themselves "grocers' printers," and yet appeal to the arch-enemies of the grocery trade for support, lament that want of knowledge which is contained in their tea-papers has proved fatal to the success of many stores. They also offer to supply mustard, which they offer to grocers at the ordinary rates, and to co-operative stores at "wholesale prices."

An improvement in the manufacture of horse collars has just been devised by a Philadelphia mechanic. The collar, being stuffed with elastic cork, is light in weight, and adapts itself to the shape of the animal as readily as if it was moulded. It is highly elastic, does not chafe or gall the neck, and, the cork being a non-conductor, injury from heat is prevented.

The San Francisco papers say that the first article of tinware manufacture from tin mined in the United States has just been completed in that city. It is a case to contain the Pioneers' certificate of honorary membership presented to the Honorable William H. Seward.

MODERN INVENTIONS.—That great invention the "Chronograph," which times all the principal events of the day, and which has superseded the clumsy old-fashioned "stop-watch," seems likely to be eclipsed in fame by that still greater and more useful invention the "Keyless Watch." The fact of no key being required renders these watches indispensable to the traveller, the nervous, and invalids. The enormous number sent even by post to all parts of the world, is a convincing proof of their great utility. The prices at which they are sold range from 5 to 100 guineas. Thousands of them are manufactured by Mr. J. W. Benson, of Old Bond street, and of the Steam Factory, Ludgate-hill, London, who sends post free for 2d. a most interesting historical pamphlet upon watch making.

MODERN CUSTOMS.—Presentations and Testimonials are largely on the increase; this modern custom appears to extend to almost every household, for no auspicious event is allowed to pass without its being marked by some pleasing souvenir; Birthdays, Christenings, Marriages, the seasons of the year, such as Christmas, New Year, &c., invariably receive special commemoration. The attention of one of the great London Manufacturers, Mr. J. W. Benson, of 25, Old Bond Street, and of the City Steam Factory, Ludgate-hill, has been directed to this subject. With the view of giving more artistic effect to this custom of society, he has published a most interesting Illustrated Historical Pamphlet upon Watches and Clocks, also one upon artistic Gold Jewellery, Silver and Electro plate; all are profusely illustrated with choice designs, and are sent post free for 2d. each, thus bringing within the reach of those who live even thousands of miles away from London, one of the largest and most artistic collections which can be seen in any part of the world; and, if necessary, designs are prepared to illustrate any special case.

TO CORRESPONDENTS.

"A." will please call at our office for a letter in answer to his advertisement.

T.—Your paper on the Land Question came to hand just as we were going to press. It shall receive attentive perusal, and as (you remind us) "we have opened our columns to the discussion of this all-important topic," it shall probably appear in our next issue.

We have to acknowledge also the receipt of communications from W. H., Dublin; from R. K. B., Cork; and from T. J., Belfast, with drawings.

R. V., Kilkenny.—The works you ask about are published by Messrs. Spion, Claring Cross, London.

The Proprietor of the IRISH BUILDER requests that all parties who have been furnished with accounts from the office will send the amounts of same immediately. P. O. Orders should be made payable to Mr. PETER ROE.

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TESTIMONIALS.

From WILLIAM TITE, Esq., M.P. for Bath, and Architect of the Royal Exchange, London.

House of Commons, 2nd March, 1864.

DEAR SIR,—In reply to your note, I beg to say that I have used both the sorts of Cement manufactured by your firm, and that of Messrs. Francis and Son; I mean the Cement usually called Roman Cement, or the more recent introduction of Portland Cement. I believe these Cements, manufactured by either of your firms, to be equally good. I know no difference, chemically or practically, between them; and I should use, and authorize to be used indifferently, either one or the other. You are at liberty to use this note, if you think it necessary.—I am, Dear Sir, your obedient servant.

Messrs. White & Son. (Signed) WILLIAM TITE.
From R.O. MINNIE, Esq., Surveyor to Board of Ordnance, London.
War Office, Pall Mall, London, S.W.,
3rd March, 1864.

GENTLEMEN,—In reply to your request, I have much pleasure in stating my favourable opinion of the quality of your Portland and other Cements, which have been extensively used in the Public Works connected with the War Department at home and abroad, especially in several of the fortifications now being erected in this country. On all occasions within my knowledge the quality has been equal to that of any other manufacturer, and has given great satisfaction.—I am, gentlemen, your obedient servant,
(Signed) R. O. MINNIE, Surveyor.

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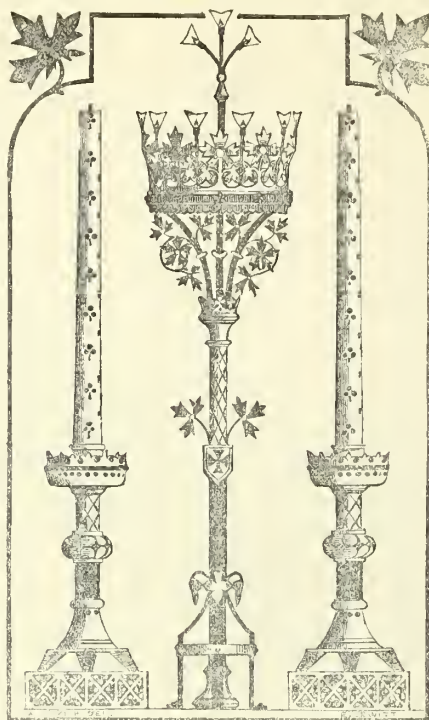
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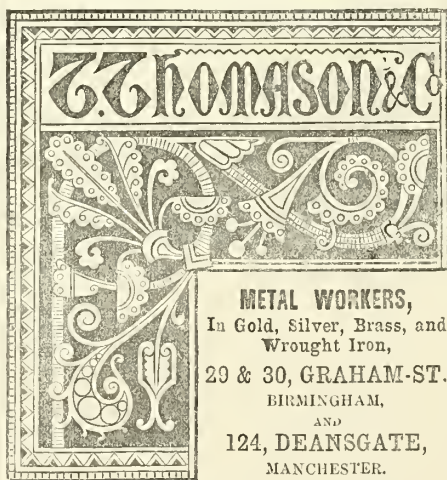
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MESSRS. EARLEY AND POWELLS beg to announce that Messrs. John Hardman and Co., of No. 1, Upper Camden-street, have resigned the business of Artists, Sculptors, Church Painters, and Metal Workers, in their favour.

Earley and Powells have added to the above mentioned business the Painting and Staining of Windows for ecclesiastical and domestic buildings, under the management of Mr. Henry Powell, who conducted the Stained Glass Department of J. H. and Co., Birmingham for many years.

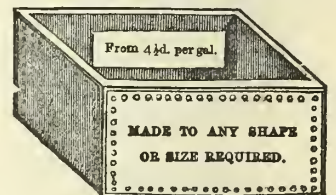
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DRAWING-ROOM DINING-ROOM CARRIAGE CHURCH
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Mr. BENSON, who holds the appointment to H.R.H. the Prince of Wales, has just published two Pamphlets, enriched and embellished with Illustrations—one upon Watch and Clock Making, and the other upon Artistic Gold Jewellery. These are sent post free for 2d each. Persons living in the country or abroad can select the article required, and have it forwarded with perfect safety.

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Agent in Dublin, with whom samples of the stone may be seen,

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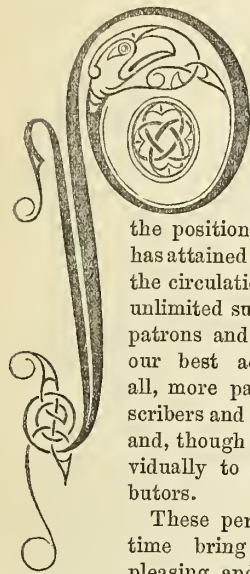
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The Irish Builder.

VOL. XI.—No. 240.

The Close of the Year—Dublin Past and Present.



PRESENT number closes our Eleventh Volume, and with it our labours for the year 1869; and while congratulating ourselves upon the position the IRISH BUILDER has attained as a class periodical, the circulation it enjoys, and the unlimited support given it by its patrons and friends, we return our best acknowledgments to all, more particularly our subscribers and advertising friends, and, though last not least, individually to each of our contributors.

These periodical rotations of time bring with them both pleasing and depressing reflections; firstly, because each is the advent of a new era, when hope is awakened as the harbinger of joys deferred, and for the realization of brighter days to come; secondly, in recalling the memories of the fleeting nature of all things earthly, while both intuitively suggest the contrast between bygone and present periods; we therefore think we could not select a more fitting time for a short notice of our city, past and present, than the close of the year.

Without going back to a remote period of history, when Dublin was noted as Eblana by Ptolemy, or called *Bally ath Cliath*, "the town upon the ford of hurdles," by the native Irish, or following its successive devastations by its Northmen invaders, we will at once refer to its position in the middle and almost to the close of the seventeenth century. Its total area, a considerable portion of which was walled in, may be described by an imaginary line* commencing at the intersection of Dame-street and where Trinity-street now stands, extending along the rere of the north side of Dame-street, through the present Essex-street, thence to Newman's Tower, which occupied the site of the southern abutments of Essex Bridge, along Wood-quay and Merchant's-quay to the rere of the west side of Bridge-street; from this point westwards there was scarcely any building until reaching Thomas-street, which, with James'-street, stretched in an unbroken line to James'-gate, on the south of which there existed no buildings except Thomas-court and a few outlying erections until reaching the Coombe, which then contained about twenty houses; continuing the line along the rere of these houses to New Market, then but partially built upon, thence by Kevin-street and Stephen-street to the position whence we started, we have the entire area of Dublin at that period, but it is to be remembered a considerable portion of the above, particularly about Kevin-street and Stephen-street and where now South Great George's-street stands, was then un-

built upon, and, if we except St. Patrick's Church, Christ Church, and the Castle, there were no public buildings of any note. A considerable suburb existed upon the north side of the river called Ostmantown (to which approach was made by the only bridge then existing opposite to Bridge-street), and consisting of Church-street, Mary's-lane, and a few adjacent streets extending to a part of North King-street. The river was then unembanked, except along Wood-quay and Merchant's-quay, and an inconsiderable portion of the north side facing where the Priory of St. Saviour formerly stood,—all the remainder was overflowed by the tide. In the last quarter of this century considerable improvements were made: several new streets were added in immediate contiguity with and within the line we have drawn; the city was supplied with water; St. Stephen's-green was levelled, enclosed, and planted; four additional bridges were erected, namely—Bloody Bridge, Essex, Arran, and Ormond bridges, all of which have since been replaced by new and elegant structures. But the progress made after the close of the seventeenth century was truly marvellous; at this period the site now occupied by Grafton-street was set at 2s. 6d. per acre as corn fields,—all the district lying south and south-east was wholly unbuilt upon; where Nassau-street now is, a narrow lane ran through the fields, called St. Patrick's Well Lane, from a well which still exists within the enclosed grounds of Trinity College, under the wall, and nearly opposite Dawson-street. Of this well there are numerous medicinal legends, while all concur that it was produced by the prayers of St. Patrick; however this may be, it was the only source of supply for pure water to the inhabitants near its locality, and for a very considerable distance around. A Latin writer thus refers to it in the twelfth century:—"This is the fountain of Dublin, plenteous in its course, sweet to the taste, which, as is said, healeth many infirmities, and even to this day is called the fountain of St. Patrick."* Up to this period the greater part of the north side, except the portion we have above described, remained under the dominion of the plough and as grazing land, while a considerable amount of it lay waste, although the fact of additional bridges being built tends to shew a greater facility of intercourse was becoming then a necessity.

From the commencement of the eighteenth century to its close we may date a greater accession of building than Dublin has ever witnessed. In 1729 the Parliament House was commenced, and at a later period the buildings of the College Library and the magnificent front of Trinity College. Further on, the Four Courts, the Royal Exchange, the Custom House, and all the present bridges across the river, except three built since 1800; several public statues, together with Leinster, Powerscourt, and Charlemont Houses, with several others; also the North and South Walls,—altogether a number of buildings which would grace any European city,—while the extension of private and mercantile houses covered comparatively an enormous area, which will be seen by reference to the maps of 1800. The exertions of the Wide Street Commissioners, then recently appointed by

* It is to be regretted that the waters of this well are not utilized as a public fountain, which they might be, at a comparatively small cost. If artistically designed, either within a wide semicircular or curved recess from the footway, it would form a highly ornamental feature in the view looking down from Dawson-street. If nothing else recommended this, its connection with the ancient history of Dublin, together with the legends attached to its name, should be sufficient.

Act of Parliament for the purpose of making a convenient way or street from Essex Bridge to the Castle—whose powers were subsequently continued by successive Acts until they eventually became vested in the Corporation of Dublin,*—contributed most materially at this period to the improvements. Under their auspices the mass of old buildings which stood where Parliament-street now is was cleared away, and the present street formed from Cork-hill to Essex Bridge; subsequently the upper end of Dame-street was widened by removing Castle Market. In 1782 they formed the approach on the northern side to Carlisle Bridge (then recently built), by continuing the line of Sackville-street from Henry-street to the quays; also in 1798 forming Westmoreland-street and D'Olier-street on the site of the old buildings surrounding Fleet-alley and Fleet-lane. This was truly the age for building new houses in the most prominent business thoroughfares.

We find, from the reports of the Commissioners, that the Governors and Company of the Bank of Ireland entered into an agreement with them for the rectangular plot of ground upon which the east side of Westmoreland-street and the west side of D'Olier-street now stand, at a rent of £1,200 per annum and a fine of £10,780, for the purpose of erecting thereon a national bank, and by referring to the map of Dublin, 1802, the site will be seen marked upon it; but in consequence of the Union, and thereby the Governors and Company being enabled to purchase the Parliament House, this agreement was rescinded.

In our time, and for a city almost devoid of foreign trade, and having to contend with numberless disadvantageous circumstances, its suburban extension has been truly remarkable, more particularly upon the south and south-eastern sides. Many can remember when the entire district of the Rathmines Township was unbuilt upon, excepting an odd detached house at considerable intervals: it is now continuous lines of elegant residences, with quarters at intervals devoted to business purposes, while its present annual valuation extends to £76,000. It is but a few years since what is now the Pembroke Township was exclusively occupied by market gardens, and it is now laid out in every quarter in magnificent roads, all but completely covered with numberless first-class residences.

The improvement in the appearance of the mercantile warerooms and business edifices, by rebuilding rather like palaces than houses of trade, has more than kept pace with its suburban growth, while the tonnage of shipping entering its port has fully trebled in the last thirty years, while the valuation of its buildings has proportionately increased. What Dublin might have become had the sittings of the Irish Parliament been continued, as we avoid all political topics, we cannot determine. But taking it as it is, we must say it is more than creditable to our period, and in its entirety really to be admired for its numerous architectural beauties. That a considerable extension to the north-east must take place within a few years, is certain. The absolute necessity which arises for increased shipping accommodation will be manifest to all even remotely interested in its commerce. The Dublin Port and Harbour Board contemplate improvements for the extension of wharfage, at an esti-

* These powers, which effected so much, are now never acted upon, from what cause we cannot determine.

* Trinity College, or the portion of it then built, lay at some distance outside this line.

mated cost of £700,000, which must at no distant period be realized. With this expenditure, stores, warehouses, dwelling-houses, and all the adjuncts of a busy commercial neighbourhood are sure to follow. These, coupled with extension in more fashionable quarters, render it difficult to tell what Dublin may be after the lapse of another quarter of a century, but we can easily predict it will be additionally worthy of being the metropolis of Ireland.

THE IRISH LAND QUESTION.

I MUST confess I feel the greatest diffidence in venturing to offer an opinion on so important a subject, and one which has for a long time occupied the serious attention of many master minds; and yet I hope it may not be considered presumptuous on my part to respectfully submit a few suggestions, with the view to their being brought under the notice of those who are better able than I am to form a correct estimate of their value.

So far as I am aware, there has not as yet appeared any scheme which has approached the position of being perfectly acceptable to *every one*; and this, I take it, is owing simply to the fact that the principle of equal justice to both landlord and tenant has been overlooked. Any *projet* which has in it—however indirectly it may be applied—the least spark of injustice, must necessarily be unsatisfactory; and, even if it becomes *law*, would sooner or later be repealed. And on this account I greatly fear that any bill which aims at a complete settlement of the question, or that proposes to deal comprehensively with the relations subsisting between the two classes in this country, must prove an utter failure, for this reason—that it is, in principle, *unjust* to coerce by law one class of persons to let or hire their property according to *any given rule*: the land is the absolute property of the landlord, and he cannot and should not be compelled against his will to dispose of it in such a manner as to suit the requirements of others, no matter how advantageous it might be to them, himself, or to both. In my humble opinion, it would be quite as reasonable to force a flour merchant or a baker to sell his wares under governmental restrictions, and adduce as a reason the necessities of his customers. But in this free-trade age such a proposition would not for a moment be entertained.

Of course I am not quite so silly as to suppose that we are not in urgent need of some *suitable adjustment* of the very unhappy position in which both landlords and tenants find themselves in Ireland, and I humbly flatter myself that I can see a way to its attainment—not by adding another new Act to our already over-burdened statute book, but by repealing the old feudal and tyrannical law, which is at variance with every principle of free trade, and a disgrace to the nation which boasts its perfection in commercial education. I refer to the “Law of Distress,” which enables the landlord by a summary process to seize for rent due, not only his tenant’s property, but the goods of the tenant’s creditors, to the debarring of the just claims of the latter therefor. This protection or privilege which is enjoyed by the landlord is not accorded to any other trader or dealer; and it places him in a false position, for it prevents people considering him in a proper light. I maintain that if he lets out or hires land for gain, he is simply a trader, and, as such, should receive from the State no special protection—in fact, he should require less security than others, as the land cannot be made away with. I will venture to say that on this view of the case being carefully studied, it will be discovered that all the troubles arising from the land question in Ireland can be traced to this circumstance; and further, that it is indirectly the fruitful source of absenteeism—that national wrong or *crime* of which the Irish landlord has been by public opinion most justly condemned.

We are all aware that the people of Ireland

—with the exception of those in a portion of Ulster, and in the neighbourhood of large towns—live by the land, and have never seriously thought of, or wished to adopt, any other mode of life or employment; and as a rule, notwithstanding what may be said to the contrary, they are encouraged in this feeling by the facilities which are afforded them of becoming tenants. A man who knows a *little* about farming, and *nothing* about anything else, has only to enter into competition with others like himself, out-bid them, and he gets his land. It is a matter of supreme indifference to the landlord or his agent whether such a man has capital, or skill, or honesty; he offers the highest price, and when the proper time comes for issuing the *distress warrant* there is no need to fear that the landlord’s interests will suffer. Thus it becomes more a system of reckless gambling than of legitimate trade, to which it must be brought if prosperity is to be secured to the country. Now these are some of the effects of landlord *protection* :—

- 1st. It encourages reckless competition for land, amongst tenants who are compelled to take it at *any price, at will, and on any conditions* the landlord chooses to make, therefore,—
- 2nd. It excludes from the possession of, and drives from the land, men of capital and skill, but who, possessing these, would require a proper agreement for their protection, and compensation for their improvements.
- 3rd. It discourages the bringing up of sons to other employments than farming; the reckless rack-rented tenant cannot educate them, cannot spare them from his farm, and probably calculates on their being able to follow his example in the gambling for land.
- 4th. It encourages emigration; for, when the land can no longer be had (there is a limit even to gambling), nor any other employment, from want of training, they must go.
- 5th. It encourages the employment of agents. A landlord would be very likely to look more closely after his own affairs, when he found that the State could not be relied on to collect his rents for him; and he might wish to see that his property was in good solvent tenants’ hands—this would lead him to come amongst us and to recognise his proper position, and therefore abolish—
- 6th. The tendency to absenteeism, and apathy about the affairs of the property, so long as the rents are forthcoming.
- 7th. It encourages petty tyrannies, corruption, and bribery, especially gifts to the wives of sub-agents and bailiffs—a species of “black mail” very commonly levied, and to meet which helps to sink the poor tenant deeper in poverty.
- 8th. It interferes with the free-trade principle, by injuriously affecting the rights of other creditors of the tenant, and it may, and sometimes does, cloak dishonesty.

I would, therefore, take the liberty of saying that the first movement towards the settlement of the land question should be to put the landlord in his proper position in the “eye of the law;” take away from him that terrible engine of destruction—the “power to distress;” and if he will set land, he must do so at his own proper risk, and be placed in no better position than any other creditor of his tenant. And from this I would expect to flow the following results :—

- 1st. A better class of tenants would be sought for, both as regards character and position, and security required for the payment of rents.
- 2nd. Men of this class are not so *very* numerous; and the landlord, in order to secure a good tenant, must offer reasonable inducements to those who would pay him his rent, without risk, and consequently the reckless competition in land would be abolished, and the system which prevails (by common consent and community of interests) in England would gradually but surely ensue.

So that, it appears to me, we can, by the repeal of an old law (which should, under any circumstances, be abolished, totally irrespective of the land question), place the landlord

and tenant in such relations to each other that the former will do for the latter of his own free will, that which it is now sought to compel him to do by law.

It may be argued that the passing of such a measure as this, would be the signal for wholesale evictions of tenants; but I am inclined to entertain a much better opinion of the greater number of the landlords, than to suppose them capable of such barbarity. That in some instance it would have such an effect, I cannot doubt; and, I believe, there has never yet been a measure introduced for the improvement or advantage of a people, or a large section of them, that had not its attendant evil consequences weighing on some persons more or less, according to circumstances. But were such a calamity seriously to be apprehended, the State, that has so long protected the landowner, might, without *very great injustice* and on grounds of national policy, extend a limited protection to the occupier. This might be done, but would not be strictly in accordance with my notions of justice; and, I believe, would in practice be totally unnecessary. It might take this form :—In the Act for the repeal of the “Law of Distress” a clause could be introduced, guaranteeing to every tenant-at-will who, at the time of the passing of the Bill, had been in undisturbed possession of his holding for a term of at least five years, a security from ejectment (except for non-payment of rent) for a period of twenty-one years, and the right to hold on the understanding then existing; and to all tenants in possession of farms, for any period under five years, for a period equal to the length of time they were in occupation, to be given in all cases, only on formal application to a duly appointed officer, and which patent or protection would cease immediately on any agreement being made or entered into between landlords and tenants themselves.

I may be over sanguine as to the results which I anticipate would succeed so very simple a piece of legislation as above shadowed forth, and, perhaps, its *simplicity* will be its greatest fault in the eyes of many; but I cannot divest my mind of the belief that it would ultimately accomplish all that the most patriotic Irishman could desire—the contentment of the greater portion of his fellow-countrymen,—and it is with this view I have written; I can plead no other excuse for trespassing on your valuable space and public attention, than my anxious desire for the welfare of my country. I am influenced by no political or party motives. I am neither a landlord nor a tenant, and cannot, therefore, be said to view the subject through the spectacles of either.

I think the great test of the accuracy of my theory would be found in the strenuous opposition which the landlords would make to the deprivation of the arbitrary power which they have wielded so long, and with such detrimental results to the nation. That power is an unjust one, and contrary to all commercial principles, and should *under every circumstance, and at once, be abolished*.

L’LIENO.

LIGHTHOUSES.*

The total number of lighthouses in Great Britain and Ireland exceeds 400; of these, something less in number than one-half are under the direct control of Trinity Board, the remainder being under the same general superintendence, but managed by district local authorities, under different Acts of Parliament. All the more important stations and great rock lighthouses are included in the former section; while they vary in dimensions from a simple column bearing a gas-lamp, to the famous erection of the Skerryvore, a granite tower 158 ft. in height.

The cost of three of these is as under :—

	Cost.	Height.
The Bishop Rock Lighthouse, near the Land’s-end	£36,000	145 ft.
The Bell Rock	61,000	117 ft.
The Skerryvore, on the west coast of Scotland	83,000	158 ft.

* From the Builder.

When a lighthouse has to be erected on an ordinary foundation, the common principles of building, of course, apply,—the weights to be carried, the height of the structure, and the accommodation to be provided, are mere matters of ordinary professional calculation. But the peculiar difficulty of constructing many of our lighthouses is derived from the fact that they are erected under circumstances of the most exceptional danger, and that the most powerful resources of engineering science have to be brought to bear to cope with unusual characteristics, either of the forces to which they are exposed or the character of the foundations upon which they are to be erected. And first, as to the forces to which they are exposed, taking the Great Rock Lighthouses as our example, the vanguards, as we may call them of our shores, which have been gradually pushed further and further from land in the face of the enemy, the sea. The force of the impact possessed by the waves of the sea in stormy weather is something terrific.

Mr. Thomas Stevenson constructed a self-registering instrument, which recorded the power of the waves that struck it, with the following result:—The average pressure at Skerryvore, for five of the summer months of 1843-4, was 611 lb. per square foot. The highest pressure registered during the height of winter storm was 6,083 lb. per square foot, and to this extreme power the lighthouse in question opposed a successful resistance. It may probably be regarded as the maximum pressure of the sweep of an Atlantic wave. In less exposed situations the pressure is much diminished. At the Bell Rock, in the North Sea, the highest registered pressure was 3,013 lb. per square foot.

The most exposed lighthouse in the world is probably the Bishop Rock. On the 30th January 1860, the following incident occurred. We may say that there is a bell provided as a fog signal, which is hung more than 100 ft. above the sea-level. It weighed 3 cwt., and was hung with unusually strong iron fittings and gudgeons. On the date above named a storm wave actually wrenched the bell from its fixing; it was dashed to pieces on the rock, and a fragment was found some days afterwards firmly imbedded by the force of the storm in a crevice of the rocks.

Such are the forces that have to be overcome. We shall now proceed to give some further detail of the erections which are found efficient in resisting these influences from year to year, and their cost.

The ordinary land-towers throughout the United Kingdom generally approach 100 ft. in height, and cost from £10,000 to £11,000; but there are many much less in size. The cost may be taken at an average of £8,000.

There are forty-seven light-vessels under the control of the Board; their average cost with the moorings complete, may be taken at £7,000; but their maintainance is very expensive, owing to the crew required. It may be taken at £1,100 per annum, or about four times that of a first-class fixed light. And here we may notice the introduction of pile lighthouses on shifting sands as substitutes for floating lights.

Proverbially the worst foundation for an erection is the sand. "The house that was built upon the sand" is the type of all unstable erections. How much more when that sand is a quicksand in a waterway covered at high water, and shifting with the currents.

The pile lighthouses have to be erected under these difficult conditions, and we shall proceed to give a detail of one or more of the successful ones, as there have been instances in which they have had to be taken down, owing to the shifting or failure of the foundations. The first was erected upon the Maplin Sands off the Essex coast, from the design of Messrs. Walker and Burgess.

It is a curious fact that sand-banks, although so treacherous at their surface under the peculiar action of the water that they will gradually absorb and bury whatever solid matter is left exposed to the action of the tide, yet when the immediate surface is passed through they afford a sufficiently

solid foundation for the erection of heavy structures upon piles. Indeed, of such a suborn and solid nature is the interior of the bank that it is impossible to penetrate it with an iron bar, although driven by a pile-engine beyond a certain depth; and it is in reliance upon this peculiarity that pile lighthouses are constructed.

The Maplin Lighthouse is erected upon nine piles of wrought iron, 5 in. in diameter, furnished with screws at the bottom 3 ft. across (ordinary screw piles) driven, or rather screwed, down into the sand; and this is the only foundation.

From these piles spring strong cross-braced timbers in cast-iron sockets, starting from about 2 ft. above high-water mark. The total height of the building is 36 ft. above the same level; and the upper portion consists of an octagon room 6 ft. high and 27 ft. in diameter, entirely framed in wood, tied together with iron, and encased with wood boarding: the lantern rises high above it in the centre.

The room is divided into two sleeping-berths, a dwelling-room, and store-room; and below the floor, in the angular space left by the intersection of the cross braces, are coal-cellars, water-tanks, and other necessary conveniences.

The cost of the whole was about £5,000; and we may here notice a peculiar instance of the action of the sea on quicksands.

When the lighthouse was built, a strong timber-framed raft was first laid upon the surface of the sand, upon which the men worked, and through openings in which the piles were driven. When the work was done, it was suggested that the raft should be left as it was, with the object of acting as a tie, and strengthening the foundations, but a curious result followed; the scour of the water lifting and dropping the raft with every wave had precisely the same effect upon the raft as it has upon a vessel, and it gradually began to work its way down into the sand, slipping over the piles, but with this difference, however, that, being held fast in its place by the piles, the sand would not cover it, but was washed away from its upper surface. It thus gradually sank for some years, lower on the one side than on the other, until there was an open pit in the sand several feet deep, and the whole size of the foundation, raising grave apprehensions as to the security of the building.

Many hundreds of heavy faggots, with tons of chalk attached, were put in, in the hope of filling the opening, but the next storm invariably swept them away.

This went on for some years, until one season the pit was so deep that a sufficient accumulation of sand gathered on the upper surface of the raft, to prevent its being again moved by the water. Once at rest, the same agent that had occasioned the damage repaired it: the wash of water filled up the pit with sand, and the top is now a level surface with the rest of the bank. The house was erected in 1840.

RE-OPENING OF MOY CHURCH, COUNTY TYRONE.

On Wednesday, the 1st inst., this church was consecrated by the Lord Primate, after enlargements and alterations, carried out by Mr. James Hughes, builder, Charlemont. The original plans were furnished by the late Mr. W. J. Barre, architect; the subsequent ones by Mr. Sherry, Belfast.

The first portion of the work was the enlargement on the south side, consisting of a wide transept and an aisle running the whole length of the church, and supported on pillars of white sandstone, with elaborately carved capitals. The contrast between the wide cut-stone arch of the transept and the smaller arches along the range of the aisle is peculiarly pleasing to the eye. The large south window of the transept standing high in the gable over an entrance-door is filled with stained glass from the works of Messrs. Earley and Powells, Dublin, and was erected by James Sloane, Esq., Moy, in memorial of his deceased wife. The artist has attempted

in these pictures to describe the complete story of a Christian woman's life. In the first light our Lord appears revealing himself to a woman in the words, "I that speak to thee am he." In the second a woman is depicted kneeling at the Saviour's feet, while he declares, "She hath wrought a good work on me." In the third he consoles a woman with the words, "I ascend to my Father and your Father." The whole window is rich in colour, and tastefully executed. The upper tracery is filled with designs which harmonise with the character and object of the whole. The other windows of the south transept and aisle are filled with tinted glass of various shades margined with light blue, the quatre-foils in the stone tracery of each being filled with deep ruby-coloured glass, and the surrounding angles with diminutive panes of rich royal blue.

The second portion of the enlargement consists of a new chancel and an aisle on the north side. The latter, erected at the expense of the Earl of Charlemont, opens into the body of the church, with two arches resting on a centre granite pillar with richly-carved capital. The chancel is a hexagonal apse, approached by steps from the nave of the church, with a broad space intervening between the arch and the rails before the communion-table. Round the cornice runs an illuminated text, painted on white vellum by an amateur. The chancel is floored with a rich encaustic tiling, which harmonises with a plainer tiling laid throughout the church. In the centre passage stands, almost midway from the door, a very beautiful font, presented by Mr. Thomas Fitzpatrick, builder, Belfast, as a memento of his sojourn in the parish.

In addition to these improvements the whole church has been furnished with neat benches in lieu of the original square pews. The gallery has been thrown back and newly fronted, and the flat ceiling of the old church converted into a handsome open roof. The two surviving windows of the old building have been replaced by others to correspond with the new windows and general architecture of the church. The pulpit and reading-desk are generally admired. The former is circular and open, the upper frame-work standing on carved wooden pillars, and is altogether a piece of beautiful workmanship. The latter is simple and chaste, being also of open woodwork tastefully designed and executed. They stand to the right and left before the pillars of the chancel arch, leaving an uninterrupted view of the chancel. Externally, the greatest pains have been taken to render the structure complete. An unsightly school-house, which stood beside the church, has been removed, and in its place Lord Charlemont has given a large and suitable house in the square, closely adjoining the gate of the church grounds. Several grave-stones and palisades, which adjoined the walls of the new aisle, have been removed to more convenient positions.

STYLE IN OLD BUILDINGS.

At a recent meeting of the Royal Institute of British Architects, Mr. G. E. Street, A.R.A., read a paper "On Some of the differences of Style in old Buildings," from which we give a few extracts:—

"The differences in style in old buildings are very great, and the result of various causes. Though mediæval art is, in one sense, entirely harmonious in all parts of Europe, it is subdivided endlessly by little distinctions of district, province, or country, which serve, practically, to create endless varieties of style and detail, all in progress at the same time. It has been assumed that these local varieties indicate divergence of principle, so that it is not safe for one man to study more than one of them. This is simple nonsense. No one understands Gothic art who has not studied that of more than one country, and there is as much difference in the style of old buildings in the various counties, districts, or provinces of one country as there is between any one of these and some

one variety of the work of another country. The work of old architects owed not a little of its vigour to its variety. The causes of variety were numerous. Among them were: 1st. The requirements of materials, which are obviously different in districts which allowed of the use of stone, brick, or timber. 2nd. The influence exercised in certain districts by exceptionally gifted architects. 3rd. The spread of art knowledge by orders of men such as Freemasons, religious orders (whose habits gave them knowledge of countries other than those in which they were for the time working), in the course of conquest or colonisation of one country by another, and the employment (not at all uncommon in the middle ages) of foreign architects. 4th. Attempts in one age to copy work done in a previous age. Of old an architect was almost compelled to use the material nearest to his hand. In spite of certain exceptional cases in which materials brought from foreign countries were used in English buildings, as a rule every architect wrought in the material nearest to hand, and in so doing dignified his art by proving that no material which God had provided was unworthy of it. The possession of a good material is of vast importance to the architect, and we, who possess such unbounded carriage and importation of fit material, must be judged in our work by a far higher standard than that which can fairly be applied to many of our forerunners. In the middle ages a good stone country produced good masons. Though the best art in England and elsewhere is found nearest to the best stone quarries, yet where such quarries did not exist, or where stone could not be procured in the neighbourhood, there the artists did their best at once to make the most of the materials which were available. Throughout Europe the early architecture was the work of stonemasons, and the carpenter and bricklayer were but little esteemed. But when, in the middle ages, other materials had to be used, there arose the first opening for a difference of style caused by a change of material. As examples of churches into the construction of which timber did not enter, Mr. Street enumerated and described the granite churches of Guernsey, and similar structures in Wales, at Bolton (Cumberland), and on the Rock of Cashel (Ireland), and elsewhere. Perhaps the early builders saw that the use of one material alone was the surest way to building for posterity. Building with stone and timber at once imports great convenience, but, at the same time, the certainty of decay some day; whilst building in metal and stone (upon which nineteenth century men pride themselves) involves the certainty of immediate decay. The use of flint in various parts of the kingdom very much affected the style of design. In flint districts stone was scarce, and buildings were erected with as few quoins as possible, and amongst the Norfolk churches are several round towers in which the use of cut stone is reduced to a minimum. At Welford, Berks, is a similar tower, built for the same reason. The use of flint, when it had reached the perfection seen in the fourteenth and fifteenth century work of the eastern counties, led to the inlaying of stone with flint in a way not only skilful, but most effective. Such examples as the Palace Gates at Norwich are evidences, among many others, of an important development of design owing wholly to the use of a particular material. Another development with flint was the arrangement of the wall-face in a diaper formed of regular squares of stone and flint, a mode common in Hampshire, Dorsetshire, and Wiltshire. The old builders seem often to have doubted the stability of flint walls, for whereas the old mortar is by no means too good in stone countries, it is often most admirable in flint districts. It was used hot, and the flintwork so laid will last for ever. Again, nothing in the history of architecture is more interesting than the marked way in which brick has affected the art of design wherever it has been used. The great fields for brick architecture were the north of Italy, the north-east of Germany, the west of France, and various

parts of Spain. The developments of each were different, but they all agreed in the discovery of certain properties in bricks. Firstly, it was found that if brickwork is to be strong, it must be built with an enormous quantity of mortar, and so, instead of specifying, as nineteenth century architects do, that "No mortar joint is to be more than $\frac{1}{4}$ in. thick," it is most likely that a mediæval specification (if such could be found) would dictate, "No mortar joint to be less than $\frac{1}{2}$ in. thick." Next, it was observed that bricks might be moulded, and that if the earth used were well tempered and fine, any delicate pattern might be produced in a hard material, which would almost defy weather. Moulded bricks, of course, involved a plentiful use of a mould when once it had been made, and the result was that in most brick districts moulded traceries were used and repeated all over a building. The cornices of the Italian churches, and the transepts of S. Katherine at Brandenburg, in North Germany, are illustrations of this treatment. In Italy, France, and Germany, the use of brick led to the erection of sham fronts in front of the roof gables, the main or only use of which was to show off the variety of moulded bricks. There is a close affinity in cause and principle between such fronts (to take typical examples from each country) as those of the Town Hall at Lübeck, the gables of the churches in and near Toulouse, and the transepts of Cremona Cathedral, whilst, nevertheless, each is entirely independent of the other in style, and evidently their architects knew nothing of each other's work. As to the effect of this brickwork upon stonework in the same districts, as, e.g., in Venice, there one can hardly look at such traceries as those of the Madonna dell'Orto without seeing that the necessary repetitions of brick traceries had probably suggested them, whilst in North Germany (at Brunswick and Halberstadt, and in that district generally) we see a remarkable type of west front, consisting of a raised gable between two towers, the sole object of which seems to have been the exhibition of magnificent traceries both to the east and the west. In the south of France, in Toulouse and its neighbourhood, the use of brickwork led to almost exactly the same kind of development as may be seen in the fronts of S. Taur, Toulouse, or that of Villa Nouvelle, not far off. The details of the work in all three districts are different, and yet in each the style has been affected by the material, and is quite unlike what it would have been if stone had been available for use. Again, what a complete change was effected in architectural design where wood only was available for building! Oak was wonderfully plentiful in the middle ages in parts of Hampshire, Worcestershire, Montgomeryshire, Cheshire, and Lancashire, but in all parts of the country wooden buildings were very common, and at the present day there remains a vastly larger number of mediæval buildings of this material than of stone. The material here, as before, influenced the system of design most decidedly. The wooden building framed together not only admitted, but required for protection from wet, those projections of one storey over the other, and the roof finished with a large board over the uppermost, which make all wooden constructions so picturesque and beautiful in their outline. Where oak was very plentiful it led to important developments of design. Our first scientific writer upon English architecture, Rickman, attempted indirectly to go into this subject by showing similarities between buildings of the same age. But since his time little has been attempted. In the middle ages, as a rule, each man's work will be found in one district, and each architect was very much in the habit of repeating himself, owing partly to want of information as to what was doing by other architects. The architects of the present day are now so much educated in what is being done all over the world that architecture has become thoroughly cosmopolitan, and so runs great risk of losing one of the greatest charms of all ancient art—its individuality and local colouring."

ART IN COMMON LIFE.*

I MUST clear the way for what I have to say on art by limiting my subject. I shall not have time, and I have not the power, to speak at all of the so-called fine arts—of painting, of sculpture, or even of architecture. A picture, or a statue, or a fine building, is indeed an ornament, in one sense of the word. It adorns a room, or a public building, or a town; but the principles which regulate the work of the successful painter, sculptor, or architect are far more complex than, though not really different in kind from, those which are concerned in making beautiful, adorning, decorating objects of daily or occasional use. In considering ornament, then, I confine myself to a study of the principles which should guide us in determining the true nature of ornament, and its proper employment. Moreover, I exclude painting and sculpture now, because, when good, they are and must be always costly, and therefore not within the general reach,—the paintings, and statues, and carvings, are often the treasures of the cabinet of an individual. Even if public taste were educated sufficiently to understand such works, they are usually inaccessible; and it should be added, that the real merit of works of fine art does not come out when they are small and apart from each. A large painting on a wall of a public building, boldly treated, illustrating some instance of bravery, charity, or devotion, and surrounded by proper architecture, of which it indeed forms an essential part, is not only of general instead of special use, but produces in the spectator a sense of the sublime, which a small picture that can be looked at by one person only at a time, which must be pored over in the hand, cannot ever achieve.

The question may be asked—Why ornament at all? We know that the earth itself is adorned, and that the so-called savage, half-civilised, and highly cultivated nations have invariably led them to colour their various war-clubs, paddles, and canoes, and that the colours and curves of these Fijians, Sandwich Islanders, and others may be called ornamental. Instinct so called of man, savage and half-civilised, as well as most cultivated. In ancient pre-historic times the cave-dwellers scratched on bone or pottery rude outlines of the animals they slew or tamed: the palaces of Nineveh are lined with sculptured slabs where palms and various forms of plants are drawn, with warriors, captives, and kings, and the spoils of battle: the seals and many ornamental objects of the Babylonians survive to our times, beautiful with minute and laboured devices. The architecture of Egypt has furnished models of excellent colour and of quaint form to our artists of the present day. The palm of the deserts and the water-lily and rush of the Nile were pressed into the service of decorating their temples by this ancient people. If we go further east we shall find in China and in India an excellent taste for colour, and some notions of form, handed down from ages, the exact distance of which from our own day, though great, is not exactly known. Time would fail me were I to endeavour to allude even to the chief styles of ornament prevailing in Greece and subsequently in Rome; of the wares of Etruria; of the metal, stone, wood, and ivory work of the Middle Ages; of the early Irish illuminated missals before the tenth century of the Christian era; of the works in carved wood of early Norwegian carvers; of Mediæval Arabic inlay; and of the period of the Renaissance or Revival of Classic Art. But the principles of true ornament may be deduced from nearly every kind of decoration, whether Greek, Italian, Egyptian, or Chinese. What these principles are I will endeavour to state.

A. Ornament as to its nature should be human; that is, should appeal to the eye, the thought, the affections of man. It must have a meaning, and the more meaning the better. Where possible it should possess as many as possible of the following properties or characteristics; it should be:—

* By Prof. Church. Read at the Cirencester School of Art. Reported in *Builder*.

1. (a) Local, (b) Historical, (c) Public, (d) Fixed, (e) Large.
It should also be:—

2. Informative and truthful. If it seems to represent anything it should represent it truthfully as far as it goes. More rich and beautiful the more extensive the knowledge which contrived it and the knowledge which it imparts. Study necessary both on the part of the artisan and the public.

B. Ornament in its application should be appropriate.

(a) Adapted to the use of the object decorated.

(b) Adapted to the material to be decorated.

(c) Capable of sufficiently good execution by trained ordinary workmen.

A. Human character of true ornament.

1. Local, Historical, Public, Fixed, and Large.

2. Informative, Real, Ideal, Conventional, contrasted.

B. Appropriate,—as to material and color; as to use; as to nature of the executant or artificer.

From these, the conditions of ornamentation, we may trace the origin and real character of conventionalism. The great colorist of Venice, the great sculptor of Greece would convey the greatest amount of truth, produce the best ornament. But we have to limit ourselves in various ways. Titian's colour and the statues of Phidias are not for every day's use. We lack the men—the genius—the skill for work like theirs, we also want to turn our ornamented objects to the purposes of common life. We cannot copy nature perfectly to begin within her full spirit, her full variety, her force, her tenderness: we must learn what we can keep, what we must omit. Then we come to the second reason for conventionalism, the use of the objects to which ornament is to be applied. Ornament must never interfere with use: it ought not to hinder, but to aid the proper employment of any article of common employment, and it should be appropriate to the object. Do not put wreaths of May blossoms or gaudily-painted pictures or photographs under glass on your coal-scuttles. A third limitation is imposed by the material. Bits of rich glass for a coloured window; of marble and stone for a pavement; a wavy line for the border of a dress; abstract forms of flowers and birds for paper on your walls; lumps and bosses and slings of molten glass upon the tumbler and the vase; sharp, clean-cut patterns reminding you of material forms of beauty, cut out in brass or hammered out in iron, or engraved in silver.

But although all ornament must be suitable to the material and adapted to the use of the object decorated, and to the skill of the workman, the conditions thus imposed upon the direct copying of nature for purposes of ornament must not lead us to forget the first principle laid down that ornament must be human, it must appeal to man. It must not be senseless,—meaningless. Let us study the several necessary conditions of deriving ornament from nature by a fair example.

Plants lend themselves readily to the decorator. Where nine workmen can carve some semblance of a flower, one only can represent anything like an animal form.

Ivy: its freedom, its variety, its curves.

Periwinkle. Bramble. Rose calyx. Clover.

A more severe treatment is required the less tractable your material.

But severe as the treatment may be, do not let it bind you down to a fixed bondage,—the bondage of the cast-iron schools,—a bondage which brought Gothic early in the nineteenth century into disrepute. Bring the freedom and variety of nature into your work, but discipline your abundant resources. Do not let stiffness on the one hand, nor extravagant curves on the other, interfere with the unity of your decoration. Fourteenth-century windows, their details varied, outline same, position influenced not by appearance primarily, but by use.

Some people may think or may say that

my subject is a trivial one—not worthy of the attention of sensible men. There are some men who care nothing for a poem unless it conveys a satire or a jest, who do not care for any form of art, and I had almost said for nature itself, for nature is, as has been well said by an English writer, *the Art of God*. I ask you, then, consider whether or no my reasons for forcing ornamental art on your attention are good. We have our work in this world; we have powers wherewith to perform it. Those powers must be trained if our work is to be well done. Are we to train all our powers, or only some?—put out some talents to usury; others lay up in a napkin, and bury in the earth? Shall we not work better in all directions if we add day by day fresh facts to our knowledge, accumulating power and the wisdom to it? Let the worker in iron learn first of all how to work the metal with skill and ease and certainty. Let him then learn how to make it into forms which shall, at least, not be ugly if not absolutely ornamental; but will it be of no service to him if he finds out in addition to all this how the iron was got out of the earth, and out of its ores; what are its properties and its components, and so forth? And he may gain advantage beyond his special handicraft by getting knowledge and hints from other arts. A man comes to the School of Art because he wants to “letter;” he learns this in a few weeks, and goes away content; but might he not have learnt more, and improved himself greatly had he looked a little further? A plain letter may be easily painted: what if he had got to learn to illuminate and design, and become known as an artistic and tasteful as well as a skilful workman? Thus I appeal to some of you on grounds of personal advantage. But I may do more—I may urge upon you the importance of developing new industries for the populations of the country, and improving those that exist on national, or social, or patriotic grounds. Honest materials, honest work, manual skill, artistic taste, and that wide and varied cultivation of the mind and hand which, applied to one's daily work, leads to invention and discovery, and the advancement of the handicraft and the country of the workmen.

Ornament and the study of its principles is a noble one: ornament may minister to a mere love of finery, unreasonable and indeed ridiculous, but this is merely one of the many ways in which anything excellent in itself may be abused. But the rich abundance and the curious variety of natural decoration at once provide us with material for our ornamental designs, and at the same time teach us the appropriateness of forms and colours to special offices. Dazzling sunlight and moonlight cold; the earth adorned with light, rolling on its course; the canopy of the sky variegated with stars and flashing with thousands of meteoric lights; the sunrise awakening the light of the world; the sunset, like the golden throne of the majesty of heaven, invested north and south by dark clouds like shadowing cherubim; the rooted mountains grand; the ocean, ceaseless in movement, varying in colour, lashed in fury of foaming wrath by the storms, or smiling with its innumerable ripples of light; the budding of the leaf; the blossoming and tender or rich colouring of the flower; the peucilling of the insect's wing; the special glory of the nature and form made in the divine image,—all these may speak to us of beauty and ornament, if we will listen and will learn.

CORK CUVIERIAN AND ARCHÆOLOGICAL SOCIETY.

THE third meeting of this society for the session 1869-70 was held in the library of the Royal Cork Institution, on Wednesday evening, 1st inst. JAMES BUTLER BRENNAN, Esq., V.P., in the chair.

Dr. R. Caulfield exhibited a tracing of a crannóg, or lake dwelling, which he made from a manuscript volume of ancient Irish maps and drawings, preserved in the Public

Record Office London, and beautifully executed on large sheets of vellum. His attention had been called to this collection, in July, last by Mr. Hans C. Hamilton. The plans appear to have been made about the year 1609. The crannóg in question is called the “Fort of the Eogher.” The island on which it is constructed is an irregular parallelogram. Its margin is closely fringed with pointed stakes, through which rivets are driven so as to secure others. These double stakes are fixed on the north and west and part of the east side, while a strong castle with a rampart stands on the south. A causeway similarly fortified with sharp stakes runs from the land into the middle of the island on the west. Within the island are residences resembling thatched cottages, and from the south-west angle a piece of ordnance projects. This plan is extremely interesting, as showing the progressive development of lake fortresses from an early period down to the beginning of the seventeenth century. In earlier times a reedy swamp in the middle of an inaccessible lake afforded shelter to the Celtic chieftain and the chosen of his clan—the hollow trunk of a tree for a boat was his mode of egress and ingress from his insular fortress. Here we have the position strengthened by a comparatively modern castle, the ruins of such as are to be everywhere seen in the present day. In the “Annals of the Four Masters,” we have frequent mention of these crannógs, viz., under the years 1247, 1436, 1452, 1455, 1500, and even down to the year 1603. Crannóg is derived from the word CRANN, which signifies trees, the trunks of trees being driven down into the mud, on which planks were placed, and on these the rude dwellings of the inhabitants. Dr. Todd enumerates twelve fortifications in his “Invasion of Ireland by the Danes,” (p. 141, note, etc.) and amongst them occurs “Dun Eochair Maige,” which is most probably the crannóg here depicted, and which the writer translates, “The fort of the bank of the (river) Maigue,” probably now Bruree, County Limerick. This place must have been of considerable importance so as to have entitled it to the notice of the English officers in the commencement of the reign of James I., and its antiquity must be considerable when we find it mentioned in reference to the Danish invasion of Ireland. In another document in the Record Office, dated 1567, we have accurately described the mode of attack. A pontoon was constructed, on which armed men sailed over to the island, the mode of destroying was by fire-works, and the place (near Armagh) was said to be “thickly bearded with stakes” that otherwise it could not be taken. The fire-works, however, failed, having got wet from the overcrowding of the pontoon, and the attacking party had to retire after some loss. Most of these lake fortresses were destroyed by fire, either from attack or accident. The charred stakes are still visible in some places, and even burnt corn, and stone and bronze implements are not unfrequently dredged up from their foundations in the lake.

Mr. Robert Day, jun., F.S.A., exhibited the following:—An oval pierced hammer, of quartzite, from Island Magee, Co. Antrim; a boat-shaped pierced hammer, of sand-stone, from Denmark, and one of felspar, diamond-shaped, from Sweden; these are all highly finished and well-preserved. Also, from Denmark, a flint chisel, 8 inches long by $\frac{3}{4}$ inch wide, polished on four sides; and a flint gouge-shaped implement, with a fine cutting edge. This and the chisel may be assigned to the later stone period, and the hammer to the early iron age. He also shewed some bronze implements and weapons from Ireland, among which were a chisel of great rarity, a leaf-shaped dagger, $8\frac{1}{2}$ inches long, having two large bronze rivets for hefting; a socketed five-spear head, $11\frac{1}{2}$ inches long, with loops in the lower parts of the blade. Both these weapons are from Bushmills, Co. Antrim. He also exhibited a winged palstave, or adze, from Coote Hall, Co. Roscommon, and another from Dublin.

OUR VISIT TO RUNNAMOAT.

SINCE the issue of our last number we had an opportunity of taking a run of over two hundred miles for the purpose of visiting the works in progress at Runnamoat, County Roscommon, the residence of Colonel Raleigh Chichester. We, after a three days' examination and close scrutiny of the system invented and patented by Mr. J. Tall, are fully convinced of its adaptability for the construction of labourers' cottages, as well as for almost any class of building. In a former number we described and illustrated the apparatus employed. We can vouch for the correctness of every statement made in our columns respecting concrete building, and can confidently recommend it as worthy of a trial. We print in another column a letter from Mr. Francis M'Owen, the superintendent of the works at Runnamoat, in which he gives an account of the progress made since last report, and also since our visit. We had the pleasure of inspecting also the drainage operations which are being carried on, and their results so far. Land which, during the memory of the "oldest inhabitant," was not worth thirty pence an acre is now yielding first-rate crops of oats and turnips. The large weekly expenditure in the shape of wages has been of incalculable benefit to the poor people, who are, we learned, in general well-disposed and peaceable.

ON VENTILATION.*

THE subject of the ventilation of private dwellings and public buildings is a very extensive one, and to discuss it thoroughly would occupy far more time than that usually devoted to the delivery of a single lecture. I propose, however, to describe—though necessarily in the briefest manner—the more important of the principles involved in the ventilation of dwellings, and a few facts illustrative of these principles; and this task I hope I shall be able to accomplish without taxing too much the patience of my hearers.

The more abundant constituents of the bodies of animals are the four elementary substances termed by chemists, oxygen, hydrogen, carbon, and nitrogen. During life the process of respiration is incessantly going on. Oxygen gas is introduced from the atmosphere into the lungs of the animal, and from those organs it is carried throughout every part of the system. Now, the oxygen thus taken into the animal mechanism unites with the carbon and hydrogen of the tissues and converts them into two substances termed carbonic acid gas and water. These latter bodies are gases, and they are thrown out from the body partly by the agency of the lungs, partly through the pores of the skin. During the disorganisation of the tissues much heat is developed, and this serves to maintain the temperature of the body at 100° Fah. or thereabouts, even though the temperature of the atmosphere is 50° lower than the freezing point. In short, atmospheric oxygen burns the carbon and hydrogen of the animal body much in the same way that it consumes the carbon and hydrogen which constitute our various kinds of fuel.

Carbonic acid gas is a very poisonous substance, and it cannot with safety be breathed even when it is mixed with ten times its volume of pure atmospheric air. There is always a small proportion of this gas in the atmosphere, and indeed it is an essential constituent of that fluid, and plays a most important part in the economy of the vegetable world. In air that may be regarded as of average purity the proportion of carbonic acid gas varies

from 4 to 6 parts in 10,000 parts. The diagram shows the average centesimal composition of the atmosphere:—

Essential	Nitrogen	77.55
	Oxygen	20.61
	Watery vapour	1.40
	Carbonic acid	0.04
	Ozone	traces
Non-essential	Ammonia	traces
	Nitric acid	traces
	Carbonic oxide	traces
	Carburetted hydrogen	traces
	Sulphuretted hydrogen	traces
	Organic matter	traces

When atmospheric air is sensibly altered in composition, its effects upon animals are also modified, and often to a considerable and injurious extent. A trifling diminution in the amount of oxygen does not render air less wholesome, provided that the deficiency is made up by an excess of nitrogen. When, however, oxygen is deficient, it is generally found that carbonic acid is in excess. When the proportion of oxygen sinks below 20.5 it may fairly be assumed that the air is decidedly vitiated. On the other hand, when the percentage of oxygen rises to 21 there is little doubt but that the air is pure.

TABLE SHOWING THE PROPORTION OF OXYGEN IN AIR.

Authority.	Place.	Percentage of oxygen.
Lewy	Atlantic Ocean, midway between Africa and America ..	20.96159
"	British Channel	20.96321
"	Bogota	21.02099
Dumas & Boussingault	Paris	20.810
Stas	Brussels	20.865
Marignac	Geneva	20.784
Frankland	Summit of Mont Blanc ..	20.963
Brunner	Fouliorn	20.910
Müller	18,000 feet high (collected from a balloon) ..	20.850
Regnan't	Toulon Harbour	20.387
Leblanc	Bengal Bay, over bad water ..	20.760
"	Chemical Theatre, Sorbonne, before lecture	19.860
"	After lecture	20.39
Angus Smith	Closet stable, Ecole Militaire ..	20.943
"	Street and subterranean air, Manchester (mean of 32 analyses)	20.630
"	Gallery of theatre, Manchester	20.770
"	Large cavities in mines ..	20.424
"	Under shafts	18.500
"	In mines where candles go out	18.500

The fluctuations in the amount of atmospheric carbonic acid are very great. Four parts in 10,000 may be looked upon as a normal proportion. A current of air free from organic matters, but containing 1 part of carbonic acid gas in 1,000, may be breathed without any bad effect being perceived. In soda water manufactories, where the air contained 2 parts per 1,000 of carbonic acid, no discomfort was experienced by the workmen.

TABLE SHOWING PROPORTION OF CARBONIC ACID IN AIR AT DIFFERENT PLACES.

Authority.	Place.	Percentage
DaLuna	Madrid—	
	Outside the walls—	
	maximum	0.0900
	minimum	0.0200
	mean	0.0500
De Saussure	Inside—	
	maximum	0.0200
	minimum	0.0450
	mean of 12 analyses ..	0.0520
	Geneva (mean of 13 analyses) ..	0.0468
Angus Smith	London, top of Monument ..	0.0528
	Mean of 25 analyses of London street air	0.0341
	Olympic Theatre, London ..	0.1014
	Pit of City of London Theatre ..	0.252
	Standard Theatre (pit) ..	0.320
Smith	Manchester streets	0.0403
	close places	0.1604
	Air of Munich	0.0500
	Bedroom with closed windows ..	0.2300
	Bedroom with open windows ..	0.0820
Roscoe	Overcrowded school room ..	0.7230
	Unventilated barracks (London) ..	0.1242

The organic matters in the atmosphere consist of a great variety of bodies. They comprise seeds, spores, pollen, minute vegetables, infusoria, insects and their remains, soot, fragments of linen, cotton, silk, and wool, hairs, particles of animal and vegetable substances, and various other matters. Minute traces of matters thrown off from animals exist in the air, and constitute the most dangerous part of the atmospheric organic matter. Pus has been detected in the air of hospitals, and epithelium from the skin

may be found in the dust of most inhabited rooms. Chalmers collected the dust in a badly-cleaned and ill-ventilated hospital, and found it to contain from 33 to 46 per cent. of organic matter. Dr. Angus Smith has studied this subject, and some of his results are shown in the table:—

TABLE SHOWING AMOUNT OF ORGANIC MATTER IN AIR.

	Cubic feet.
Pure air on high ground, 1 grain in from 176,000 to 209,000	
In a bed-room	56,000
Inside a house	16,000
In a closely-packed railway carriage ..	8,000
Air of a cesspool	62

The experiments of Dr. Angus Smith clearly prove that the headache and other symptoms which we suffer from in ill-ventilated places are nearly altogether the result of the organic matter, and not of the carbonic acid, of the vitiated air. Hammond found that a mouse died in 45 minutes in air containing a large amount of organic matter, but no carbonic acid. Other experiments have afforded similar results.

On an average, a healthy adult man inspires (takes into his lungs) 16½ cubic feet of atmospheric air per hour; the air thrown out from the lungs contains a much larger proportion of carbonic acid than the air taken into them. In general, the air expired contains 124 times as much carbonic acid as the air inspired. It is, therefore, not sufficient to supply a man with 16½ cubic feet of air per hour—the exact quantity which passes into his lungs,—he must be supplied with 2,000 cubic feet, for it requires that quantity to reduce the proportion of carbonic acid (4 per cent.) in the air which is hourly thrown out from his lungs to 0.04 per cent. Air thrown out from the lungs and re-inspired without having been previously mixed with oxygen would be decidedly poisonous.

Sick persons require more air than do those in robust health. In diseases of an inflammatory character there is an abundant exhalation of organic matter—and that of the most dangerous kind—which, unless speedily oxidized, renders the atmosphere intolerable. A less supply than 3,500 cubic feet per hour is insufficient for a sick adult or even child. Gangrene, pyæmia (blood poisoning), small-pox, erysipelas, and typhus and puerperal fever taint the air to an extraordinary extent; and persons suffering from those diseases should be supplied with from 7,000 to 10,000 cubic feet per hour. In typhus and pyæmia almost complete exposure to the open air has been attended with the most favorable results. It is now generally believed that persons suffering from phthisis are much benefited by remaining in the open air during the whole day, unless the weather be unfavorable.

General Morin—a very high authority—in a report to the French Government in 1830, gives the statements shown in the diagram.

AMOUNT OF AIR REQUIRED, PER HEAD, PER HOUR, IN TEMPERATE CLIMATES.

	Day.	Night.
In Barracks	1,059 cubic feet.	2,118
Workshops	2,118	"
Prisons	ibid.	"
Theatres	ibid.	"
Hospitals	2,825	"
Idid, during dressing hours ..	4,236	4,236
Idid, during epidemics	5,650	5,650

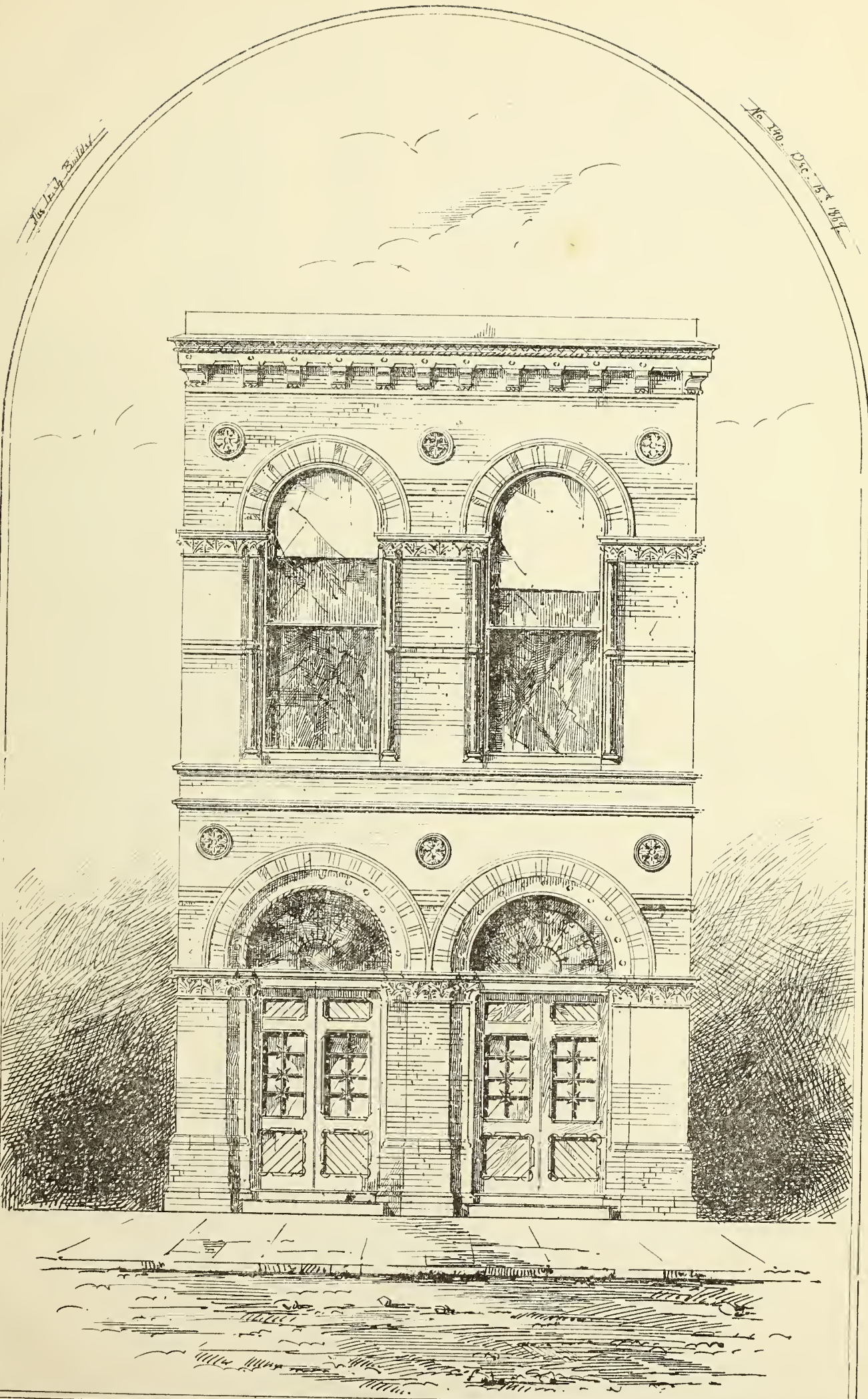
In British barracks the regulation allowance of air is 1,000 cubic feet per hour.

The effect produced on air by the combustion of candles, oil, gas, and fuel is, so far as the production of carbonic acid is concerned, the same as that caused by respiration. One pound weight of oil consumes about 140 cubic feet of air, but the animal organic matter thrown into the air during respiration is more injurious to health than even the carbonic acid gas is. Every cubic foot of coal gas uses up the oxygen of from 14 to 15 cubic

* By Professor Charles A. Cameron, Ph.D., M.D., Honorary Member. Read before the Royal Institute of the Architects of Ireland.

The Irish Builder

No. 170. Dec. 15. 1858



ENTRANCE to the PROTESTANT HALL in CORK,

R. P. Beale. Arch.

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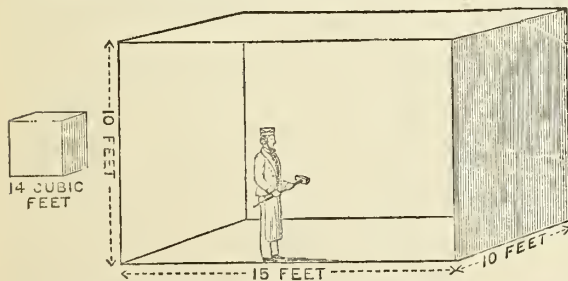
feet of air. An ordinary gas-burner consumes nearly 45 cubic feet of air per hour, and, therefore, vitiates the atmosphere of a room to an extent nearly equal to that produced by the respiration of three men. In calculating the quantity of air to be supplied to rooms in which people are sleeping or working, the number of gas-lights, candles, or lamps burning, and the quantity of fuel undergoing combustion in them, must be taken into account.

In the diagram are shown the amounts of carbonic acid produced by the combustion of various illuminating agents in such quantities during 10 hours as to evolve a light equal to that given by burning 20 sperm candles, each weighing 120 grains:—

	Cubic Feet of Carbonic Acid.
Tallow	10.1
Wax	8.3
Spermaceiti	8.3
Sperm Oil	6.4
London Gas	5.0
Manchester Gas	4.0
Cannel Coal Gas	3.0
Boghead Coal Gas	2.6
Leshahago Coal Gas	2.3

A rich coal gas, therefore, gives as much light, and but one-fourth the carbonic acid, as are evolved from tallow candles; and tallow candles, in producing as much light as an equivalent amount of cannel coal gas, evolve twice as much heat.

The space allowed to each soldier in sleeping and other apartments is fixed by the military authorities at 600 cubic feet in permanent barracks; 400 in huts; 600 in wooden and 1,200 in permanent hospitals at home, and 1,500 in the tropics. In the London lodging-houses the legislature prescribes 30 superficial and 240 cubic feet per head. According to the poor law regulations, each person is allowed 300 cubic feet to sleep in; 500 if sick. In Dublin, 300 cubic feet per head is the minimum space permitted in the registered lodging-houses—9,000 in number; but in too many of the dwellings of the poorer classes the space allotted to each person is often less than 200 cubic feet. A room 10 ft. high, 15 ft. long, and 10 ft. wide, contains 1,500 cubic feet of air, and may, according to the Sanitary Act of 1866, accommodate five persons. The diagram shows the comparative size of a man and that of a room of the dimensions which I have described. The cube shows the quantity of air which every hour passes into the lungs of one person, averaging both sexes and all ages. The cube also shows the volume of air used per hour, as compared with the size of a man.

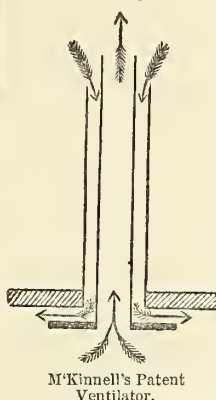


The atmosphere of even the largest room in which persons are living becomes vitiated, unless there are apertures of sufficient magnitude to admit fresh air, and to allow the foul air to escape. In a sleeping apartment there should be an opening of at least 24 square inches to admit the fresh air required for one individual—adult or child; and as foul air is usually lighter than fresh, there there should be an aperture 25 square inches in extent, to allow it to pass out of the room.

It is often somewhat difficult to ventilate buildings without at the same time producing unpleasant draughts; but the thing is never

actually impracticable. Rooms in private dwellings need never want for pure air if the least attention be bestowed on the arrangements for their ventilation.

The outlets for the vitiated air should be removed as far as possible from the inlets for the pure air; otherwise the circulation of the air throughout the apartment is not so perfect.



into the room; and the lower part of it being provided with a flange, the air at first spreads along the ceiling, and afterwards descends by the walls to the lowest part of the room.

Arnett's ventilator is simply an opening, provided with a valve, leading into the chimney. It is most useful for the purpose, but occasionally smoke from the chimney forces a passage through it into the room. On the whole, my experience of this ventilator is very favourable.

The air thrown off from the body and the gaseous products of combustion are very light, and rapidly ascend. It follows, therefore, that the vitiated air should pass out at the highest point of the apartment. The purer and heavier air should be admitted about eight feet above the floor. If the apartment is ventilated by heated air, then the openings for its admission may be at or near the floor, but cold air flowing into a room at the lowest point occasions much discomfort, by cooling the feet, and in other ways. The air may be warmed by passing it through boxes heated by coils of pipes, through which a current of steam or of hot water flows; but under no circumstance should air from a furnace be admitted into rooms. An economical method of introducing pure warm air into a room is to construct the open fire-place or stove flue in such a way that the air heated by the outer surface may pass into the room. This system of simultaneously heating and ventilating apartments is likely to come into general use in private dwellings, for it has been found very successful in many hospital wards and barrack-rooms.

Where gas is burned, ventilation may be effected by having an opening in the ceiling exactly over the gas-lights, and a tin tube leading from it direct to the open air. The cost of the tube (which is placed between the ceiling of the room to be ventilated and the floor of the one above it) is seldom more than a pound, and in case of small apartments only a few shillings. The nearer the gas jets are to the opening, the better is the ventilation; but when the distance is considerable I find that the ceiling ventilators are not nearly so useful. When the tube is passed into the air it should not be carried up too high, otherwise down draughts might be produced. A second tube placed round that containing the heated products of the combustion of the

gas will have its contents heated; and if an opening from it be made into the upper room, a large supply of pure, warm air may be economically obtained. If required, the outer tube may be made to discharge its contents into the room where the gas is burning.

Perforated bricks are now very generally placed in the walls of houses. Iron frames covered with perforated zinc are good substitutes for the porous bricks; when provided with valves—to close them if necessary—they are very good ventilators. Mr. Louch, of this city, has devised an excellent ventilator. It consists of a wooden box, containing three or four partitions of perforated zinc. The box is inserted obliquely in the wall near the ceiling, and the air passing through it is divided into numerous currents, and directed towards the ceiling. I have seen this ventilator work very well, but it does not secure complete immunity from draughts.

In ventilating rooms, large or small, we should bear in mind that the warmer the outlets are the more rapid and perfect will be the passage of impure air through them; for, when their temperature is lowered to that of the external air, they are as likely to allow pure air to enter as they are to permit the foul air to escape.

The plans proposed for ventilating and heating churches, theatres, and other large buildings are almost innumerable. The Houses of Parliament are ventilated by means of air forced into them by powerful machinery. In summer, cold air, and in winter warm air may be, by propulsion, introduced into large enclosed spaces. Some of the Paris hospitals are ventilated and warmed at the same time, by means of a current of heated air forced into the wards by steam. One advantage of this plan is, that the air may be obtained from a great height above the level of the ground, where it is most likely to be free from organic impurities. Sometimes, however, the air 50 ft. or 60 ft. higher than the street level is rendered impure by the smoke evolved from manufactories.

In ordinary rooms, the doors, windows, and fire-places act, or, at least, ought to be used, as ventilators. A sitting-room, with a good-sized aperture in the ceiling, an open fire-place, and an open door, seldom has an impure atmosphere.

In winter, the combustion of fuel produces a strong current of air up the chimney. Stoves are not nearly so useful for this purpose, as there is no wide, open space above the fuel. Two currents of air are always passing towards an open fire-place; one of them supplies oxygen to support the combustion of the fuel, and passes into the grate; the other rushes up the chimney without being consumed, and thereby drags, so to speak, a fresh supply of air into the room. In summer it is the fashion to close the registers of grates, and thereby prevent the chimney from being useful as a ventilator. Instead of doing this foolish act, it would be better to render the chimney still more useful by placing at the top of it one of Norton's Archimedeal screw ventilators. This apparatus consists of a drum-shaped fan, attached to an Archimedeal screw. The fan is so arranged that a very feeble current of air is sufficient to set it in motion; and whilst it rotates it turns round the screw attached to it, producing a spiral column of ascending air through the chimney. This ventilator may also be employed instead of the perforated bricks or other contrivances for allowing the

egress of foul air. In some institutions I have seen three sashes in each window—an admirable contrivance for either admitting air or allowing it to escape at different heights from the floor.

In determining the size of the tubes or other channels through which heated air is delivered we may use a convenient formula, which I shall write down. It is based on the formula of Montgolfier, and the discharge is calculated for the hour and for square inches. Let h be the height of the column of heated air, t its temperature, t' the temperature of the external atmosphere, $\cdot 002$ the ratio of expansion of the air for each degree of temperature on Fahrenheit's scale, and 100 a constant. D is the delivery required every hour, and ϕ the inlet and outlet area in square inches. In order to find ϕ :—

$$\frac{D}{100 (\sqrt{h (t-t') \times \cdot 002})} = \phi$$

In the construction of new buildings, architects would render a great service to the public were they to make the most ample arrangements for thorough ventilation. This matter is receiving more attention than was formerly bestowed upon it, but its vast importance is not yet fully realized, and more especially in the case of private dwellings. Personally I feel much indebted to the members of the Institute for their kindness and indulgence in allowing me to bring this subject under their notice, for, on most of the points to which I have referred, every member present is better entitled to speak, *ex cathedra*, than I am.

HOWARD'S STEAM BOILER AND SUPERHEATER.

A DESCRIPTION of the new boiler and superheater patented by Messrs. Howard appeared in our (*Colliery Guardian*) columns some months ago, but since that time certain further improvements have been made therein with a view to increased efficiency and safety. The boiler is now made entirely of wrought iron, and an improved method has been devised for joining the horizontal with the perpendicular tubes. After many preliminary experiments, conducted with much care, in January, 1866, J. and F. Howard constructed a boiler of forty-horse power for their own works upon a somewhat novel arrangement. Subsequently another of the same kind was fixed, the two replacing Cornish boilers formerly in use. The results of their working have been so satisfactory that it is with the utmost confidence they direct public attention to their new "Patent Safety Boiler and Superheater." The new boiler is built up of wrought-iron tubes, the bursting pressure of each of which is at least 2,000 pounds per square inch, and the whole of the steam pipes and connections are tested to a pressure of 500 lb. In the very unlikely event of the bursting of a single tube no dangerous accident could ensue. The result would only be equal to the opening of a valve, with a rush of steam and water into the heating chamber, a sudden lowering of the steam pressure, and possibly the extinction of the fire. The new boiler has less area of water surface per horse power than the Cornish boiler, but this smaller area is fully compensated for by increased length of water range, which is more than three times that of ordinary boilers, and any irregularity in the supply of feed water is more readily detected. In getting up steam to the working pressure much less coal is required than is consumed by the ordinary Cornish boiler. The heat is readily absorbed by the tubes, and the highest amount of evaporation is obtained. A Gauntlett's pyrometer placed in the flue leading to the chimney indicates the temperature of the escaping gases at nearly the same heat as that of the steam in the boiler. The current of heated

gases impinges on the surface of the vertical tubes at right angles, instead of simply gliding underneath, as in the ordinary Cornish and tubular boilers. The relative value of the two kinds of heating surface has been set forth by an eminent engineer in these words: "The effect produced by the direction in which the heated current strikes the surface may aptly be compared to the rolling of a cannon ball rapidly along a sheet of ice, as compared with letting it fall vertically on its surface." By a simple contrivance, which is peculiarly applicable to this description of boiler, smoke may be effectually consumed. Engineers seem pretty well agreed that much may be done to reduce the cost of steam power by using high-pressure superheated steam. The new patent boiler and superheater is well adapted for this purpose. The upper parts of the tubes, forming the steam space or reservoir, being exposed to the radiated heat of the heating chamber, and the current of heated gases which have already passed among the tubes containing the water, the steam may be superheated to any desired degree. The circulation of the water is so perfect throughout the boiler that with ordinary care no burning out or fouling of the tubes takes place. Each tube has within it an internal one rising up through the water space, dividing the water into annular and central columns. The current of heated gases impinging upon the tubes causes the water in the outer spaces to rise to the top and flow down to the bottom of the inner tubes; in consequence, a most active circulation is kept up in every part of the boiler. Messrs. Howard go so far as to state that water containing a large percentage of lime, or other earthy or saline matters, may be used in the new boilers without inconvenience or danger. Another important feature in this new boiler and superheater is that no bolt or joint is exposed to the action of the fire, and it has no rivets or seams in its construction. Every part being made on the interchangeable principle, the repairs can be done by any ordinary fitter. The tubes being counterparts of each other, any of them may be brought in succession to that part of the boiler where the heat is most intense, thus greatly increasing their durability. The tubes are so arranged and fitted in sections that each is free to expand and contract; the variable expansion and contraction, therefore, to which they are subjected in the heating chamber produces no injurious effect. With reference to portability, economy of space, and facility in setting, Messrs. Howard state that three men are sufficient to move and fix the boiler in almost any position, and the largest piece will pass through a common doorway. It can be packed in a very small compass for exportation, and can be transported on bad roads, through mountainous districts, or on the backs of camels. The space occupied by the new boiler when fixed is little more than half that required for a Cornish boiler of the same power; and although the most convenient shape is a parallelogram, it may be adapted to almost any position. The brickwork setting is plain; where there is only one boiler it is set between two straight walls; but where there are two or more boilers, a straight dividing wall is all that is required in addition.

BOILER EXPLOSIONS.

THE frequent disasters occurring from steam-boiler explosions are attributable in many instances to ignorance of the original cause, or may be traced to culpable neglect. An erroneous notion generally prevails, which ascribes to the expansive pressure of steam the motive agency that works the engine; whereas the phenomena indicate that electric action supplies the amazing power developed and constitutes the gigantic strength displayed, steam forming only a medium. The nature of steam and the condensing process exhibit conditions essentially distinct from explosive force, and produce different effects. Furnace fires heating water in boilers to a high degree of intensity evolve electric fluid

in large quantities, and generate vapour charged with inflammable gas, elements combining vast energy with formidable ingredients, which demand the exercise of expert management and scientific skill, safely to regulate, guide, and control, through the instrumentality of mechanical contrivances. The fact has been ascertained by means of several experiments, that cold water, particularly at a temperature in frost ranging under zero, suddenly conveyed into immediate contact with caloric, imparts an electric shock, in some respects analogous to lightning, and bursts like a bombshell, projecting fragments of resisting materials in various directions to considerable distances. When water runs low in the boilers, inflammable gas accumulates in the vacant space, and the iron plates becoming red hot, explosions often ensue with similar results. In order to obviate the risks and remedy the dangers arising from these sources, the necessary precautions require the simple care of feeding the boilers with warm instead of cold water, and keeping them constantly replenished, expedients that will prove on trial adapted to prevent fearful catastrophes of the kind involving destruction of property and loss of life. It may be found useful to observe that the directions prescribed extend to apparatus employed for cooking purposes, and the same system can be pursued with benefit on a small scale in domestic economy or more extensively with regard to public institutions.—M. J. K. in *Express*.

TOPOGRAPHY OF THE COUNTY OF CARLOW.

ITS CASTLES, MANSIONS, DEMESNES, ETC.

No. I.

THE County of Carlow, without any poetical effort of the imagination, may be said to be the "Garden of Ireland." It is watered from north to south by two of the principal rivers of the country.

The Barrow, which rises in the King's County—beyond Rosnash—in the Slievebloom mountains, traverses a considerable portion of the great Bog of Allen, and after a course of upwards of sixty miles eastwards towards Kildare, suddenly takes a southern course and passes by the flourishing towns of Athy, Carlow, Bagnalstown, Graigenamanagh and New Ross, and empties itself into the noble estuary of the Suir, a short distance below Waterford.

The Slaney is a much less considerable stream than the Barrow; in a commercial point of view it is inferior. The former river has numerous rapids, forming, I should say, a good field for gentlemen of the Isaac Walton school. The fishing in the Slaney is said to be good, particularly above Newtownbarry, for trout and salmon. It takes its rise in the County of Wicklow, and leaves about one-sixth of Carlow County to the eastward; it passes by the excellent little towns of Tullow and Newtownbarry, where it enters the County Wexford, and empties itself into the Irish Sea at Wexford town.

The County of Carlow is purely an agricultural one. The land, in general, is of excellent quality; the most cordial relations exist between the lords of the soil and their well-to-do tenantry.

The gentlemen's seats are of a very superior class, particularly those of Mr. Bruen, M.P., Oakwood; Mr. Kavanagh, M.P., Borris House; Mr. Newton, D.L., Dunlecking, &c.

I was shewn over the latter exquisite little palace a short time since, and a more tastefully laid out house and grounds it never fell to my lot to witness, either in these kingdoms or on the Continent. The house is built of pure white granite, capable of bearing the minutest and most elaborate dressings; were it not for the site being so low, it would be a residence fit for a prince. As you enter, your eyes and admiration are bewildered when you behold the *coup-d'œil* that presents itself to your view: a vast hall, about 60 ft. by 40 ft., hung with family pictures and banners; suits of armour deck its walls, and articles of the chase, with guns, bayonets, and pieces of ordnance scattered here and there, reminding

one of some of Sir Walter Scott's best scenes in his favorite English novels. The fireplace in this grand hall is of large dimensions. The grand staircase leads up directly from the hall to the first landing by a flight of stone steps. The balustrades are altogether composed of black walnut, and are of the most costly and studied character. The drawing-room furniture is of the most modern description; whilst here and there are specimens of the fine arts which it would take a Turner or a Claude to excel—the work of one of the daughters of the house. The proprietor of Dunlecking shews an immense amount of refined taste, rarely to be met with in one's journey through life. The side-boards in the dining-room are valued at 300 guineas each; the carving on them is executed with boldness, great care, and in masterly style. In short, articles of *verthé* of the most *recherché* nature perplex one as he rambles through the saloons and drawing-rooms of Dunlecking. C. E.

P.S.—In my next I shall have something to say of Borris House and demesne.

THE ROYAL HIBERNIAN ACADEMY.

THE annual distribution of prizes to the students took place on the 7th instant at the Academy House, Lower Abbey-street.

The chair was occupied by THOS. A. JONES, Esq., president of the Academy.

The president said that, as a business man, he would commence the real business of the evening, and before addressing the meeting he would present the prizes that had been awarded to the successful competitors.

The prizes were then presented as follows:

Silver Medal.—Drawing (Chalk, from the life).—William Millard.

Bronze Medal.—Painting (Oil from the life).—R. O'Farrell.

The President then proceeded to deliver his address. After some introductory remarks he said—We had considerable difficulty in awarding the prizes. You will pardon me in saying there was no “one bright particular star” which distanced all competition; but the average of merit was high and evenly balanced, and any further allusion to the respective merits of the candidates would be manifestly unbecoming me, as one of the judges. Of one fact, however, I can assure you, that we gave each drawing careful consideration, and our final award was unanimous. And here I must take the opportunity of stating that we were of opinion that there was a deficiency in attention to detail, and the usual slurring over difficulties in the careful rendering of the extremities, and but for those faults the works of one gentleman would have attained high consideration from the artistic qualities and breadth of manner evinced in his studies. And I wish most particularly to call your attention to this axiom in art study. That facility, and what is called a masterly handling of the clark or pencil, when they are the result of knowledge, are doubtless some of the highest and most dazzling qualities which can be arrived at; but they are at the same time the latest—you cannot begin with them. You cannot, with a few masterly touches, indicate the difficulties which the living model presents unless you know well the bony structure beneath, and the action—the ever-changing action of the muscles and tendons which overlay it. If you can do this, you are no longer a student, you are a master, and no school or academy can teach you further. How sad, therefore, it is to the experienced eye, to see young men of ability year after year wasting their time in efforts to attain that mechanical felicity which can only be arrived at by previous labour, and doubly sad to think, as Sir Joshua Reynolds strongly puts it, that “there is scarcely an instance of return to scrupulous labour after the mind has been debauched and deceived by this fallacious mastery.” If you think what I am now impressing on you is only dry and unpalatable precept, I would ask you to visit our National Gallery. There you will see many original drawings by the old masters, and many fac-

similies of their sketches. I have been so much impressed with this ever-recurring defect in the drawing of students, that the first time I was in a position to do so, I have asked the Inspector from the Science and Art Department, Mr. Eyre Crowe, to ask the department to favour us with a few specimens of standard studies from the living model, and he has readily and kindly entered into our views, and we hope soon to have an opportunity of placing before you some of the careful works of Mulready and others, in hopes they may assist you in forming your style—though at the same time we would deplore any servile imitation, and only hope that while you preserve your own individuality of treatment, you may be induced to correct your shortcomings by reference to some of the best authorities we possess. Mr. Crowe has also suggested the formation of a class for drawing from the antique, on much the same principle as the competition classes from the living model; a special prize to be awarded to the best drawing from a given statue. This I should be most anxious to see carried out if the department can enable us to make the necessary arrangements. Never in the history of this academy has there existed greater apathy outside its walls. Never in the history of any civilized community has there been greater ignorance of everything appertaining to art, or a greater disinclination on the part of the wealthy and educated classes to foster and encourage the talent of their native country. Thus the Royal Academy of Ireland struggles year after year to maintain its position, and every year opens its exhibition to the Dublin public. The Dublin public rarely enter its walls, know nothing about it, nor care to know. We have a National Gallery which is a credit to our capital. I have visited most of the galleries of Europe, and it is my opinion—and I am not alone in that opinion—that in its internal arrangements it is one of the best I have met with, taking its size into account. In it we have some works of first-rate excellence, and the majority of the pictures upon its walls are highly instructive in an educational point of view. These are a small but carefully-selected collection of Turner sketches, and some finished drawings in water-colours by men whose names are familiar as “household words” to the artist and the amateur. In the entrance hall a collection of casts from the antique is unequalled in this country. The admission is free, and the gallery is situated in the most frequented and fashionable quarter of the city. And how is this noble gallery appreciated? I will venture to say that of the highly cultivated inhabitants of Merrion-square and the immediate neighbourhood, not one in twenty have ever entered its doors, and many, if asked by a stranger where our gallery was situated must confess their ignorance, though they cannot look out of their windows without seeing it. What can art hope from such a public? In conclusion he said—Our men of genius and in the land of the stranger their talents are appreciated, and their praise is sung by other lips. The land that bore them is alone silent and sad, and those who love her best are sullen in their silence—except when haply, as our bard sings—

“Some chord indignant breaks,
To show that still she lives.”

We are fond of repeating the refrain of the song, “There's a good time coming,” and I trust there are some here who may live to see it. For me that hope would be vain. But I must content myself with telling you how to hasten its approach. Be true to yourself and to each other; remember you are Irishmen, and Irishmen should be brothers. Remember, though your nationality is down-trodden, it is a nationality still, and each man pledge himself that he will do everything in his power to cause his country to be respected, and he can best do that by being himself a credit to her.

Mr. M. A. Hayes proposed a vote of thanks to the president.

Colonel Meadows Taylor seconded the motion.

He expressed himself highly gratified at

the very able and truthful character of the address, and he called on the students to persevere.

The President returned thanks.

Dr. Stapleton suggested that the exhibition of the Academy should be opened earlier in the year.

Mr. Hayes intimated that the Council had already recognised this, and that the next exhibition would be opened on the 1st of March. He thought, though people talked a good deal about nationality, there was very little national feeling shown. On a recent occasion, when an opportunity occurred of giving encouragement to Irish artists, the patronage was given away out of the country.

Mr. Gilbert said that the sooner it was known that the people who were put forward as patrons of art really did nothing for it, the better. He saw no reason to despair, and thought a proper art union would be a great means of extending art. He moved that the president be requested to prepare his address for publication.

After some further discussion, the proceedings terminated.

IMPORTANCE OF CEMENT IN BUILDINGS.

THE Belfast Portland Cement Company's offices at their railway works, Greenacastle—now being roofed in,—is built on what was formerly “slob land” under high-water level. The railway embankment, aided by certain valves, excludes the tidal waters, so that this slob to landwards is now partially reclaimed. Sometimes, however, when there occurs a continuous heavy fall of rain for a few days, the upland water from the high grounds along the Cave Hill descends in volume, so as to place under water for some time the slob lands reclaimed. One of these downpours occurred recently, at a time when the walls of the buildings alluded to were about 5 ft. above the joists of the first floor, and placed the ground under about 15 in. of water, in which state it remained for about eight hours. The specification for the construction of the offices contained a detailed description of the manner in which the cement mortar for the super 2 ft. foundation course of brickwork should be prepared and applied. Mr. M'Fall, the builder, declares that had it not been for this precaution, which he at first considered quite unnecessary, he would be a heavy loser, as he considered that it would be impossible for the building to stand for one hour in the water with the gale that was then blowing. From this it may be inferred that, next to good cement, skill in its preparation and insertion in buildings is of the greatest importance.

CORRESPONDENCE.

[It is to be distinctly understood that although we give place to letters of correspondents, we do not subscribe editorially to the opinions or statements set forth in same.]

DAMP.

TO THE EDITOR OF THE IRISH BUILDER.

SIR,—I have read in your journal a paper upon “Damp,” from which I have derived much interesting information; but it occurs to me that, in treating damp in basement storeys arising from capillary attraction, a much better and really very little more expensive damp-course can be provided than the one suggested—“coal tar and sawdust.” Coal tar spread upon a damp or cold surface rapidly coagulates, forming numerous air-bubbles amply sufficient to cause the permeation of damp; independent of this, in laying the next course every stone would immediately disturb the layer of tar underneath, adding thereby to the evil. If each stone could be successively and smoothly laid in its bed, without after disturbance from the mason's hammer, which even in ashlar work is impossible, it might be perhaps in a manner effective. A sheet of 3lb. lead laid entirely over the courses is the true remedy; but this is far too expensive to be recom-

mended in ordinary practice. One equally effective, and which, from its inexpensive nature, is no hindrance to its being used in every instance, would be to lay the common asphalt roofing felt (well coated on both sides with coal tar, in which a small quantity of pitch has been boiled), so as to completely cover the footings after they have been levelled off and pargetted over. This, if properly executed, will effectually resist ground damp, and will be as durable as the stone of which the wall is composed.

I am of opinion there are but few instances where it is not necessary to adopt some precaution of this description, no matter whether the material of the superstructure be porous or non-porous, whether the substratum be of retentive clay or a gravelly bottom, and gravelly bottoms, we all know, if they have no sufficient outlet, will be at particular seasons fully as charged with moisture as the most retentive clay. I have always found it was the mortar more than the material of the wall which acted as the conductor, even where the first course is laid ever so dry, and the most ample space left for water to percolate through. The retention of water in the trenches can, of course, be avoided by drainage at the lowest level of the footing courses, but this is often impracticable, and in some deep foundations all but impossible.

VERITAS.

THE PROVINCIAL BANK TRIAL.

TO THE EDITOR OF THE IRISH BUILDER.

SIR,—I have learned with much satisfaction, from the last number of your paper, that the officers of the Provincial Bank have been defeated in what to me appears almost a *diabolical accusation* against their architect and contractor—both men, as I understand, of the highest respectability, and pre-eminently successful in producing (in the case of the new bank house in College-street) what you are very right in calling a “palatial structure.” When I was in Ireland some time since, I visited this building, and I must acknowledge that I have never in my life experienced greater gratification than the examination of the work afforded me. I am considered a severe critic in this respect, but the examination of every portion which came under my observation was so perfect that I failed to discover any single thing with which I could reasonably find fault; and I am not a little surprised to hear that the entire cost of the works has been so very small as not to exceed £26,000; including, as it appears, a very large sum for substructure, which of course I could not see. I consider this building as one of the very best executed works to be found anywhere; a lasting memorial to both architect and builder, and an additional ornament to your already “beautiful Dublin”—a city, the recollection of my visit to which I recall with the liveliest satisfaction. I enclose my card, but not for publication.

AN ENGLISH CONTRACTOR.

HEWAT v. NOLAN.

TO THE EDITOR OF THE IRISH BUILDER.

SIR,—The *last building case* which you have reported—that of Hewat v. Nolan—must have startled not a few of the builders in this country. Every contractor who at present is engaged in carrying out either public or private works, under an architect or engineer, may at any time find himself placed in the position which the contractor for the Provincial Bank found himself in, and from which I will venture to say he has extricated himself only at an enormous expenditure of time and money (notwithstanding that the decision in his case carried costs with it). I sincerely trust that this case will have the effect of rousing the Irish builders to a sense of the danger which must always threaten them while they remain, as at present, a *disunited body*, without any rules or principles to guide them, and depending in many cases on the usage of the trade as an argument in a law court, when every member of the craft has

an independent usage of his own. You, Mr. Editor, have certainly done your duty in laying this want of unity before your readers, and in keeping before our eyes, on every occasion when opportunity afforded, the baneful consequences of the stupid apathy which appears to have fallen on the Irish contractors. It has been more than once stated that Irishmen are incapable of meeting together in such a union without disagreeing and dividing. I have no belief in such a gross libel. I believe the truth is, every one is waiting for some one else to make a beginning; and although all see the necessity for an association, no one is desirous of putting himself forward as a leader in the matter. Now, I think, an opportunity is afforded which may not again occur, and the chance should not be lost.

Mr. Nolan has nobly fought out his battle against a wealthy institution, and has established not only his own character, but also that of the body of which he is a justly-prized member. It may not be generally known that a compromise was sought to be effected, which would probably have been quite as advantageous to him in a pecuniary sense as the decision in the Court of Equity has been, but he indignantly refused such an offer while an imputation rested on his honor, or that of the architect under whom he executed the work. For this independent conduct he deserves the esteem of every man in Ireland, and from the builders he is entitled to a special recognition for the principles he has sustained single handed; and it will be a disgrace to us as a body if we do not take some means of showing our appreciation of the services he has rendered us. I would, therefore, suggest that a suitable testimonial should be presented to Mr. Nolan; that it be done in the most public manner, at a banquet to be given by the builders of all Ireland, and that advantage be taken of the circumstance to hold a conference, and establish “an association of Irish builders,” which, it is to be hoped, would embrace every man in the country who had any claim to be recognised as a contractor. I hope this suggestion will not pass unnoticed, but that a few gentlemen will be found with sufficient *esprit de corps* to come forward and constitute a committee to carry out the necessary arrangements. I shall be most happy to lend my aid, and my subscription will be forthcoming when required.

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[We most cordially agree with the sentiments expressed in the above letter. It has always been our anxious wish to see a “builders’ association” established. If a few gentlemen would move in the matter, we are sure it could be done. We shall be happy to receive the names of those who are disposed to form the committee suggested, and to afford every aid in our power.—ED. I. B.]

BUILDING PROGRESS AT RUNNAMOAT.

TO THE EDITOR OF THE IRISH BUILDER.

SIR,—I send a few lines, as you requested, with regard to what has been done in concrete here since you left, and also what has been completed and in progress since the date of Col. Chichester’s letter, which appeared in the IRISH BUILDER of 15th ult.

Of the first building, which has already been fully described in the Colonel’s letter, and also had your personal inspection, it is needless to make any further mention. The second is a square of buildings, or rather trapezium, on plan, the extreme length on the north side being over 100 ft.; east end, 62 ft.; west end, 75 ft. On the north side, on the line of roadway leading from the back entrance-gate, is a cart-shed 84 ft. in length; the back wall, running the entire length, 8 ft. in height and 9 in. thick, of concrete, is crossed by six framed principals, the ends of which in front of cart-shed are supported on metal pillars; the other ends projecting beyond the 9-in. concrete wall 10 ft. 6 in. on the inside, rest on a breastsummer and hard wood posts on cut-stone blocks, forming a

range of cattle-sheds, the entire span being 31 ft. 6 in. At the east end and entered from the cart-shed is a tool-house, mess-room, and kitchen. At the west end, and entered from the same, is an office; adjoining which is a wrought-iron double gate 8 ft. wide enclosing this yard, the eyes of the upper hinges of gate are embedded in the concrete wall and hold their grip most tenaciously; the gate swings quite free. On the same range are guano, lime manure, and straw houses, the two latter being entered from the yard. I expect in another week to have the roofing completed on these buildings, and the slaters at work covering in same with 2ft. 9 in. queens ton louvre slating. On the opposite side of the roadway we have another building, 75 ft. long by 23 ft. wide, comprising a slaughter-house and covered manure-pit. The door-frames, &c., are all fixed in their places, and the walls levelled round for the roof, except a portion of the back wall, which can easily be finished in a few days. Farther on east is what was formerly the haggard. We have here a large square to be divided in the centre by another covered liquid manure tank, 86ft. long by 18 ft. wide, not yet commenced. On the west side of this square we have erected an open cattle-shed running the entire length, the roof on the back side resting on the old wall (rubble) and the front on breastsummer and hard-wood posts on cut-stone blocks; the end and connecting walls are of concrete, and the roof covered with 2 ft. 9 in. queens ton louvre slating. On the east or opposite side we have commenced a two-storey building, also running the entire length; the upper storey to be for hay, &c., and the lower for stall-fed cattle; the whole of the front and end walls to be of concrete, with ten opes along the front, 5 ft. wide, and piers 2 ft. 6 in. by 9 in.; these opes have neither stone nor wood lintels, but merely the concrete,—a tolerably good test.

I do not at present touch upon the many other extensive improvements in the dwelling-house and out-offices, but confine myself to a description of the concrete works completed and in progress on the farm buildings alone.

We have been subjecting the concrete work to the severest tests with regard to its strength and durability, under all circumstances, and in every kind of weather; and, so far, I have every reason to believe in all the merits Mr. Tall claims for his patent. The apparatus is easily handled, and does its work well; it only requires to become generally known to be fully appreciated.

FRANCIS M’OWEN.

ART AND RELIGION IN ROME.

AMONGST the many subjects of interest in this Emporium of Art, to which the attention of the readers of the *Athenaeum* may be directed, is the Hall which has been erected in St. Peter’s for the use of the Oecumenical Council. It is not so much to the general arrangements as to the decoration of the building that I now advert, and though these do not belong to the province of what is called high art, still from their association they may deserve a separate notice. Unhappily, the appearance of the grandest temple on earth which was ever erected to the honour of God has been marred, for how long one cannot tell; it may be for six weeks, or six months, or eighteen years; or, if all the questions propounded are to be discussed and answered, for all time. The whole of the north transept is now cut off, shut out from view by a wooden wall made, as far as was possible, to assume the appearance of the façade of a building of mason-work. Above the principal entrance, which is anything but grand, is a tympanum, triangular, of course, in form, contrasting harshly with the sublime round arch which far and far above looks down upon it with something like contempt. The painting with which the tympanum is adorned represents our Saviour projected as it were from the clouds, only half the body being seen. The arms are extended, and whilst one hand rests on the open Gospels, or rather holds them, the other sends forth, for such is the attitude,

the disciples to preach the Gospel of Peace. Underneath are inscribed the words—

Docete omnes gentes.
Ecce Ego sum vobiscum omnibus diebus
Usque ad consummationem seculi.

This painting, like all the others which decorate the Hall, is done in *tempera*, or in distemper, and the one I have just described is by Signor Grandi, a Roman. It was executed in three days, and is very effective. On the obverse is a painting of the Madonna, and being in the inside of the building and facing the Pope is suggestive enough of the Mariolatry which throughout Italy seems to have usurped the place of the worship of the one true God. This is the work of another Roman called Chiari. Over the Papal throne, which is at the farthest extremity of the Hall, and faces the entrance, is a large painting, representing 'The Gift of Tongues and the Feast of Pentecost.' It is perhaps one of the best, and was executed by Piatti, a young Roman artist of considerable genius. To the right a Roman artist, Nobili by name, has represented 'The Council of Ephesus,' and opposite to it on the left is a representation of 'The Council of Trent,' by Antonio Benini, of Ferrara. Near to it, on the left, is a painting of 'The Council of Nice,' by Mei, a Roman, and opposite to it, next to 'The Council of Ephesus,' is that of 'Jerusalem,' by Sylvio Capparoni. Thus the Gift of Tongues and the four great Councils of the Church are the subjects which have occupied the artists, and which will principally attract the attention of the assembled ecclesiastics. Four colossal paintings, by Piccerilli, fill the higher order of niches, which hitherto have been vacant, and these represent St. Chrysostom, St. Augustin, St. Jerome and St. Ambrose. Over and above all these are displayed the paintings of twenty-two heads of those Popes who have presided at or who have called Councils. From the height at which these and other paintings are seen it is impossible to say much of their merit, but of the drawing of the heads I may speak highly, as the models were those which decorate the Church of St. Paul. These are the works of pictorial art which have been executed for the Hall of the Ecumenical Council. It is not pretended that they belong to high art, and when the assembled prelates shall have terminated their efforts to effect impossibilities they will probably be torn down; they form, however, a page in history, and a notice of them will not be without interest. The Hall, which they really decorate, is a parallelogram running north and south, the Papal throne being at the extreme end on the north. It stands on a semilunar dais, around which are placed, on the right and left of the Pontiff, seats for sixty Cardinals; just below them, and almost at their feet, on either side, are seats for five patriarchs—ten in all; whilst outside the dais, on the right and left, on seven tiers of benches, are seats for 616 Bishops, which may be increased to 700 if necessary, though not probable. The *profanum vulgus*, to begin with royalty, are assigned two boxes erected in the walls, on either side of the Pope; lower down the hall, in two orders of galleries above the Bishops, are seats for the diplomatic body, Pontifical Councillors, Theologians and Secretaries; whilst other small deer will be placed in the body of the hall. Facing the Pope, and in the centre of the axis, stands the altar, and by its side the Orator's box. Thus you may form a fair idea of the temporary building, which must, however, endure for all time if the questions proposed are to be discussed and decided satisfactorily.

I have wandered somewhat from my original object, which was simply to give you a description of the artistic decorations of the Hall of the Ecumenical Council summoned by Pius IX., and will now beg you to accompany me to another church, which has for some years been under repair, and which will well repay the trouble of a visit. It is that of S. Lorenzo, outside the walls. Without entering fully into details, let me direct the attention of the visitor to four frescoes by Franceschini, now, unhappily, deceased. He died, at the early age of twenty-eight, last

February, lamented by all lovers of Art as a public loss. A public funeral was given to him, and he was mourned by all Rome as a man whose genius bade fair to revive the best days of fresco-painting. The subjects which he treated were four great events in the life of the Saint, two being his defence before his judges, whom he astonishes by a narrative of his labours and his miracles; and his condemnation. Even artists, and that is saying not a little, speak of Franceschini with admiration and regret.—There is also in the church of San Lorenzo a lunette of great merit, by Cochetti, representing the worship of the Lamb, as described in the Revelations; but good taste will regret the addition of many meretricious ornaments.

As yet no attempt has been made to apply the preparation of silicate or liquefied glass to frescoes in Rome, for one reason perhaps, that in this climate the necessity is not so urgent, but in painting in *tempera* artists now begin to use *sugo d'erba* vegetable juice instead of size, which is supposed to fix the colours better.—H. W., in *Athenæum*.

THE PROTESTANT HALL, CORK.

WE give an engraving of the front of the Protestant Hall, Cork, now in process of erection. The hall was erected some eight years ago, from the designs of Mr. Richard R. Brash, M.R.I.A., but the entrance leading to it from the South Mall was never completed; it is now proposed to cover in the entrance, which is 80 ft. long and 20 ft. wide, and to erect a reading-room and other offices over the space. The new buildings have been designed by the same architect, and have been contracted for by Mr. R. Walker, builder, of Cork. The front will be executed in Henderson's white brick and Portland stone, the plinth and bands in white limestone.

EDINBURGH AND DUBLIN— A CONTRAST.

THE *Athenæum*, in giving a *résumé* of "Scottish literature," starts with this observation:

"There is something unusually stirring in the literary news from Edinburgh. The promises and announcements of new works are full of interest." And winds up with the following expression of regret respecting the decline of the publishing trade in our city:—

"We have only to regret that we cannot report so favourably of Irish literature as of Scottish. Save Mr. Joyce's 'Names of Places,' the Irish press has of late produced little or nothing. There was a time when Mr. Exshaw and twelve or fourteen other Dublin publishers were as busy as Edinburgh and Glasgow publishers are now. Political passion seems to be as deadly to literature as to landlords."

From our experience of over forty years in Dublin, we have to join in the regret of our contemporary. It is our opinion that in many instances blame must be attached to our publishers: they did not sufficiently study the interests of authors, and therefore they could not be induced to have their works published here.

ACCIDENTS.

Two accidents are reported as having occurred in Belfast during the past week. One by a piece of iron falling on a man whilst working in the ship-building yard, Queen's Island. Another to a man whose back was injured by a hammer-shaft in a foundry. Both are under treatment in the General Hospital.

NOTES OF WORKS.

Mr. John Nolan, building contractor, of Meredyth-place, has been appointed by the War Department to carry out extensive alterations and additions to the soldiers' quarters, Palatine-square, Royal Barracks, Dublin, under the superintendence of the Royal Engineer Department.

MISCELLANEOUS.

INSTITUTION OF CIVIL ENGINEERS OF IRELAND.—A general meeting of this body was held in the Museum Buildings, Trinity College, on Wednesday evening; J. Ball Greene, Esq., President, in the chair. Mr. Jas. Price, member, read a paper by Mr. Wm. Anderson, ex-President, entitled, "Record of some Experiments on Heating Water and Condensing Steam by Tubular and Double-cased Vessels." Mr. Charles P. Cotton, member, also read "Some Remarks on a Novel Means of Transit for Minerals in the county of Sligo." An interesting discussion followed the reading of the papers.

In a Convocation of the University of Oxford on Thursday (25th ult.) a grant of £2,000 was passed to assist Mr. J. H. Parker in the excavations which are being made at Rome under his direction; and a statute was promulgated accepting a proposal made by the same gentleman for endowing the keepership of the Ashmolean Museum with the annual sum of £250 in addition to the present stipend: intending to require the keeper to provide occasional lectures on points in archaeology, which may be illustrated by objects in the Museum, Mr. Parker himself to be the first keeper under this arrangement. Another decree was also promulgated increasing the salary of the Teacher of Hindustani, which provoked a discussion, in which the proceedings of the Civil Service Commissioners for India were strongly commented upon. A third decree was also promulgated allowing females to be examined by the Delegates of the Oxford Local Examinations.

A materialist surgeon of Paris lately showed to one of his friends one of his instruments, the handle of which was carved in bone. "Do you know," he asked, "of what this handle is made?" "Of ivory I suppose." "No," said the doctor, while tears almost choked his voice, "it is the thigh-bone of my poor aunt."

LYING AND IMPOSTURE.—Architecture, in the present day, is a sham of the most hurtful and dangerous type. In our large cities ranges of tenements are "run up" with astonishing speed; and the mushroom-like growth of immense streets, erected in a few weeks, necessitates the present arrangement of pretence and imposture in connection with what should be the noblest art. Among architects there are, probably, as many charlatans as artists; and lately, since builders, joiners, and other tradesmen, quite untrained in any way for the work, have added "architect" to the list of their trades, the most incongruous monstrosities disgust men of taste at home, and astonish the foreigner who visits this "nation of shop-keepers." In mercantile pursuits lying is used for the purpose of making a sale, simply as a matter of business. What is most peculiar in this phase of the vice, is, that business men themselves know, even when in the act, that the person lied to is perfectly aware of what is being done, and that exactly the amount of credit will be given to the statements made which they deserve. What enormous lies and gigantic swindles are every day given to the world by our huge speculators, whose trade to a great extent depends upon successful lying. What bubble schemes are promoted, what disgraceful and untruthful balance-sheets are made up by fraudulent companies, and how much misery is engendered through the wholesale use of dishonesty and deceit.—*Period.*

MODERN CUSTOMS.—Presentations and Testimonials are largely on the increase; this modern custom appears to extend to almost every household, for no auspicious event is allowed to pass without its being marked by some pleasing souvenir; Birthdays, Christenings, Marriages, the seasons of the year, such as Christmas, New Year, &c., invariably receive special commemoration. The attention of one of the great London Manufacturers, Mr. J. W. Benson, of 25, Old Bond Street, and of the City Steam Factory, Ludgate Hill, has been directed to this subject. With the view of giving more artistic effect to this custom of society, he has published a most interesting illustrated Historical Pamphlet upon Watches and Clocks, also one upon artistic Gold Jewellery, silver and Electro-plate; all are profusely illustrated with choice designs, and are sent post free for 3d. each, thus bringing within the reach of those who live even thousands of miles away from London, one of the largest and most artistic collections which can be seen in any part of the world; and, if necessary, designs are prepared to illustrate any special case.

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A Title-Page and Index to Volume for 1869 will be issued with next number.

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See the **ATHENÆUM** for December 25.

NOTICE.

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From WILLIAM TITE, Esq., M.P. for Bath, and Architect of the Royal Exchange, London.

House of Commons, 2nd March, 1864.

DEAR SIR,—In reply to your note, I beg to say that I have used both the sorts of Cement manufactured by your firm, and that of Messrs. Francis and Son; I mean the Cement usually called Roman Cement, or the more recent introduction of Portland Cement. I believe these Cements, manufactured by either of your firms, to be equally good. I know no difference, chemically or practically, between them; and I should use, and authorize to be used indifferently, either one or the other. You are at liberty to use this note, if you think it necessary.—I am, Dear Sir, your obedient servant,
 Messrs. White & Son. (Signed) WILLIAM TITE.

From R. O. MINNIE, Esq., Surveyor to Board of Ordnance, London.
 War Office, Pall Mall, London, S.W.,
 3rd March, 1864.

GENTLEMEN,—In reply to your request, I have much pleasure in stating my favourable opinion of the quality of your Portland and other Cements, which have been extensively used in the Public Works connected with the War Department at home and abroad, especially in several of the fortifications now being erected in this country. On all occasions within my knowledge the quality has been equal to that of any other manufacturer, and has given great satisfaction.—I am, gentlemen, your obedient servant,
 (Signed) R. O. MINNIE, Surveyor.

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